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Please provide one (1) copy of the file history for U.S.Patent No. 4,732,097 (unless Anne Kornbau previously ordred this file (I couldn't find any indication that she did)). Also include any prior art refs and any applications from which the above patent may have been derived.

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United States Patent [19]

Guilhem

[11] **Patent Number: 4,732,097**

[45] **Date of Patent: Mar. 22, 1988**

[54] **PROCESS FOR SEWING AND FOLDING A FLEXIBLE WORK PIECE**

[76] Inventor: **Christian Guilhem**, Route Nationale 20, 82350 Albias, France

[21] Appl. No.: **932,178**

[22] Filed: **Nov. 18, 1986**

[30] **Foreign Application Priority Data**

Nov. 20, 1985 [FR] France 85 17743

[51] **Int. Cl.**[4] **D05B 97/00**

[52] **U.S. Cl.** **112/269.1**; 2/274; 29/91; 29/91.5; 112/441

[58] **Field of Search** 112/269.1, 268.1, 267.1, 112/262.1, 162, 441; 2/275, 274, 244; 29/91, 91.1, 91.5

[56] **References Cited**

U.S. PATENT DOCUMENTS

726,311	4/1903	Klemm	112/269.1
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24964	of 1906	United Kingdom	112/269.1
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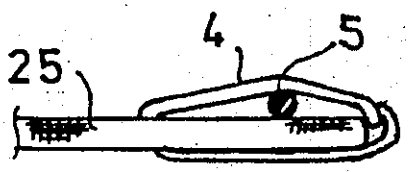
Primary Examiner—H. Hampton Hunter

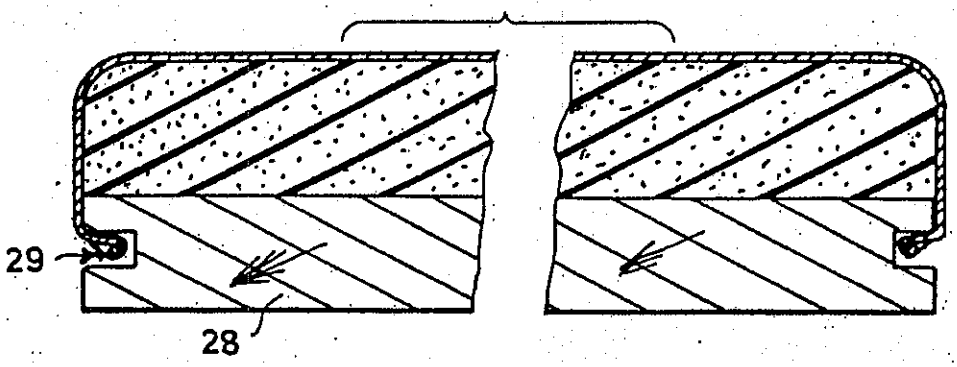
Attorney, Agent, or Firm—Harold H. Dutton, Jr.

[57] **ABSTRACT**

The invention concerns a process for folding a flexible piece, in particular to upholster an object such as chair fitting with a flexible cover. The upholstering or covering process comprises cutting out a flexible piece (25) to a shape corresponding to that of the object plus a border on its contour, providing the edge of this border with a tensioning thread sliding within a passage preserved by auxiliary threads, covering the object with the piece so that the border provided with the tensioning thread project beyond the object contour, folding back the border and applying tractions in opposite directions on the two ends (5*a*, 5*b*) of the tensioning thread to tighten and to fold this border, lastly, after the tractions have been applied, locking the ends of the tensioning thread either by tieing them together or by stapling them to the back of the object or by crushing a punched-out clip (31) on the back of the object.

13 Claims, 22 Drawing Figures







No. 726,311. PATENTED APR. 28, 1903.

H. A. KLEMM.

THREAD AND CORD EDGE FINISH FOR FABRICS.

APPLICATION FILED OCT. 2, 1901.

NO MODEL.

FIG. 1.

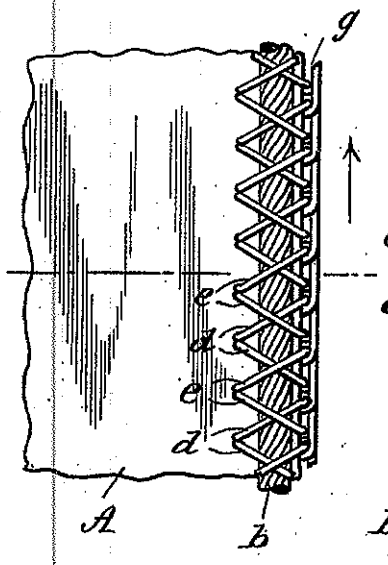


FIG. 2.

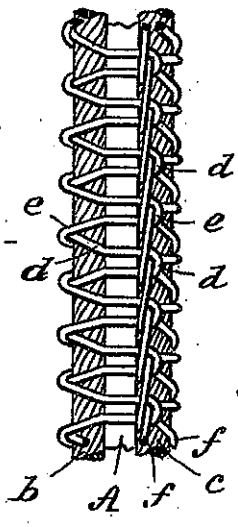


FIG. 3.

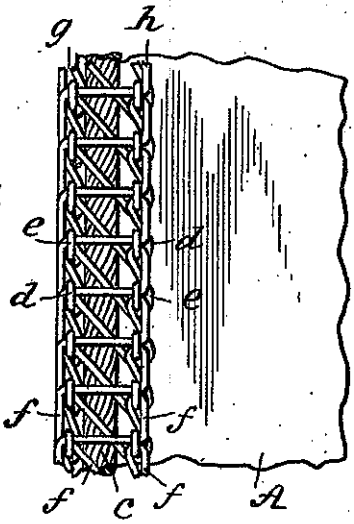


FIG. 4.

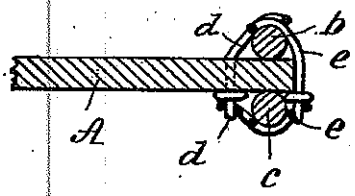
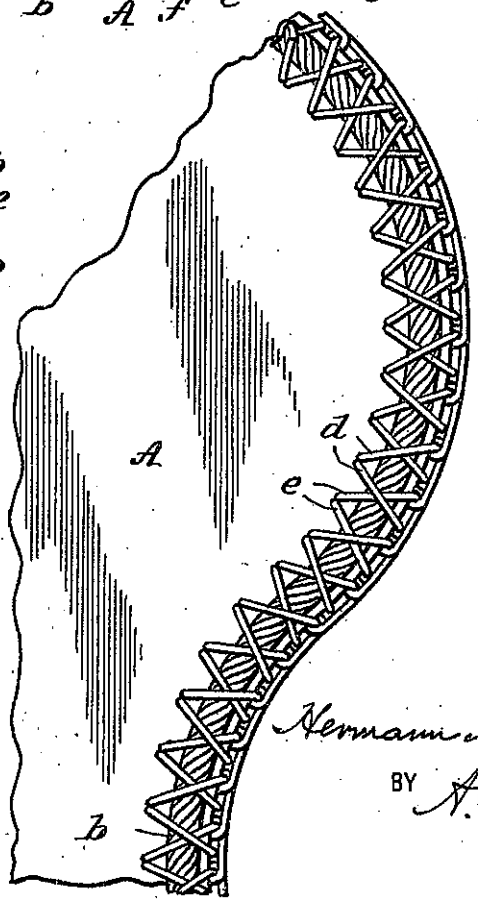


FIG. 5.



WITNESSES:

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C. Sedgwick

INVENTOR

Hermann A. Klemm

BY A. P. Thayer

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HERMANN A. KLEMM, OF NEW YORK, N. Y., ASSIGNOR TO SOPHIE HESSEL, OF SHELDON, CONNECTICUT, AND AMELIA HESSEL, OF NEW YORK, N. Y.

THREAD-AND-CORD EDGE-FINISH FOR FABRICS.

SPECIFICATION forming part of Letters Patent No. 726,311, dated April 28, 1903.

Application filed October 2, 1901. Serial No. 77,281. (No model.)

To all whom it may concern:

Be it known that I, HERMANN A. KLEMM, a citizen of the United States of America, and a resident of New York city, county and State of New York, have invented certain new and useful Improvements in Thread-and-Cord Edge-Finishes for Fabrics, of which the following is a specification.

My improved edge-trimming for laces, knit goods, and other loosely-meshed fabrics consists of cords laid on the margins of the fabric near the edge, one or more on each side, and secured on one side of the fabric by double-zigzag needle-threads and secured on the other side by a looper-thread inserted transversely of the seam through the loops of both lines of needle-threads and securing the needle-thread loops, one of the said lines of needle-thread loops being made along the edge of the fabric and together with the looper-thread forming an improved edge-trimming and incidentally a binding to the edge of the fabric and the other line of needle-thread loops being made inside of the cords, as hereinafter specifically described, reference being made to the accompanying drawings, in which—

Figure 1 is a plan view of a short section of my improved edge-trimming formed in a straight line. Fig. 2 is an edge view of the same. Fig. 3 is a plan view of the same inverted. Fig. 4 is a transverse section on line 4 4 of Fig. 1. Fig. 5 is a plan view of my improved edge-trimming formed in scallops.

a represents the fabric; *b*, a cord laid on the upper surface of the margin as near the edge as may be desired. *c* represents another cord similarly placed on the lower surface of the fabric.

d represents one of the zigzag needle-threads, and *e* represents the other of said zigzag needle-threads. These threads cross the cord *b* diagonally in reverse inclinations, and thus cross each other on the cord and practically in the middle of the same, thus constituting a double-zigzag seam.

f represents the looper-thread, inserted through the loop of the needle-threads directly across from one line to the other of said loops under the fabric and over the cord *c*, both directly and diagonally, and forming chains, as *g* and *h*, along each row of needle-loops, as seen in Fig. 3, one of which chains *g* is located at the edge of the fabric and forms an ornamental feature of the trimming, an especial advantage of which is that the overedge thread-crossings are doubled in number those of a single-zigzag thread, and are consequently only half as far apart, thus making effective and satisfactory binding of ragged edges of lace goods and the like which cannot be made with the single-zigzag thread.

Thus it will be seen that I provide very substantial ornamental edge-trimming, and incidentally a binding for fabrics of the character specified.

Although I have represented only one cord on each side of the fabric in the drawings, it is obvious that I may apply one or more on each side, as may be desired, and I include this in my claim.

It will be seen that my improved edge-trimming is especially adapted for substantial trimming for lace and other open-mesh goods by reason of one of the lines of needle-thread loops being made along the edge of the fabric and together with the looper-threads forming binding consisting of a chain of thread links in which there are in each stitch two loop members comprising one member of two needle-thread loops crossing said edge at a distance apart and a chain of looper-thread loops coupling said needle-threads along the edge, as shown in Fig. 2.

I am aware that in the patent to Stockton Borton, No. 640,085, of December 26, 1899, for improvements in ribbons or bands a sewing-machine having a vibrating needle to form what is commonly termed a "zigzag" stitch as a means of securing a cord on the margin of a band is incidentally referred to as a possible means for so securing the cord; but my claim is specific to double-zigzag stitches in which the threads of one line of stitches cross the threads of the other line of stitches intermediately of the two lines of stitches and intermediately of the stitches of the two lines.

I am also aware of the French patent to Sidgreaves, No. 103,232, dated April 29, 1874, in which double-zigzag threads cross each other on the upper surface of the fabric and

are secured on the under side by two lines of shuttle-stitches.

What I claim as my invention is—

Edge-trimming for laces, knit goods, and other loosely-meshed fabrics, consisting of the combination with the fabric of a cord or cords laid on the margin of each side of the fabric near the edge, the cord or cords of one side of the fabric being secured by double-zigzag needle-threads crossing each other and said cord or cords midway of the lines of needle-stitches and midway of the stitches of both lines, and the cord or cords on the other side of the fabric being secured by a looper-thread inserted transversely of the lines of the needle-threads through the loops of both lines of said needle-threads and forming one directly-transverse line crossing said cord or cords and one diagonal line also crossing said cord or cords, thus providing two crossing lines of thread to both upper and under cords between the loops of the respective lines of needle-threads, one of said lines of needle-thread loops being made inside of the cords and the other line made along the edge of the fabric and together with the looper-thread forming binding to said edge whereof the respective members of the edge line of needle-thread loops cross said edge at a distance apart and more effectually bind edges of open-mesh fabrics.

Signed at New York city this 14th day of September, 1901.

HERMANN A. KLEMM.

Witnesses:
A. P. THAYER,
C. SEDGWICK.

June 11, 1929. C. THEROUX 1,717,075

HAT SWEAT AND PROCESS OF MAKING THE SAME

Original Filed Aug. 4, 1924

Fig. 1.

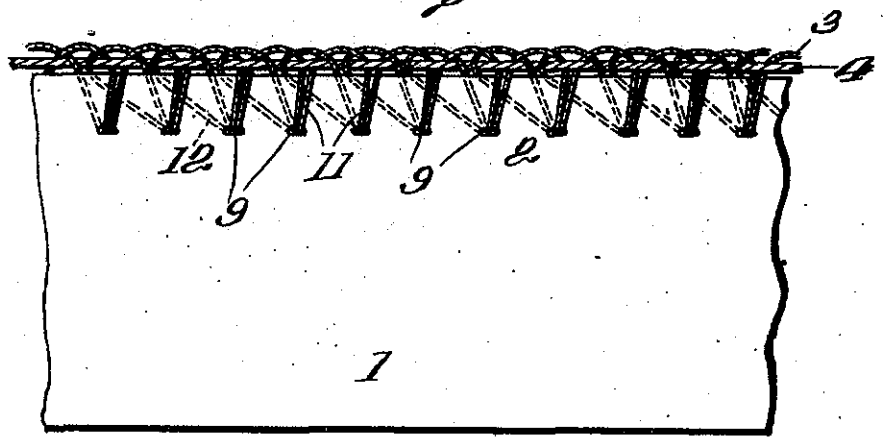
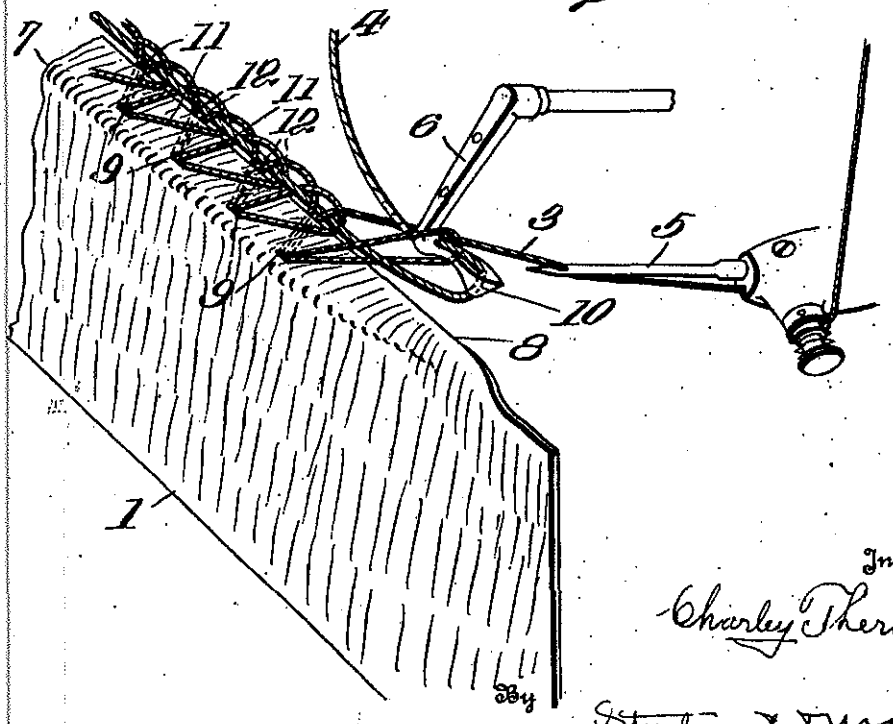


Fig. 2.



Inventor
Charley Theroux

By Sturtevant Thurman
Attorneys

Patented June 11, 1929. 1,717,075

UNITED STATES PATENT OFFICE.

CHARLEY THEROUX, OF STUTTGART, GERMANY, ASSIGNOR TO UNION SPECIAL MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

HAT SWEAT AND PROCESS OF MAKING THE SAME.

Original application filed August 4, 1924, Serial No. 730,015. Divided and this application filed March 1, 1926. Serial No. 91,530.

The invention relates to new and useful improvements in hat sweats and the process of making the same.

It has long been customary to stitch to a hat sweat a reed which is used in connection with the securing of the hat sweat to the hat.

An object of the present invention is to provide a hat sweat having an edge covering which is formed of stitching threads and wherein one of the threads lies along the edge of the hat sweat and is secured thereto by the enchained loops of the stitches, so that said thread can be used for the securing of the hat sweat to the body of a hat.

A further object of the invention is to provide a process of forming an edge covering for a hat sweat, wherein the edge covering stitches may be passed through the hat sweat at a considerable distance back from the edge thereof and one of the stitching threads of the concatenated over-edge stitches laid straight and taut along the edge of the hat sweat, whereby said thread may be used for securing the hat sweat to the body of the hat.

In the drawings which show by way of illustration one embodiment of the invention—

Figure 1 is a plan view of a hat sweat embodying my improvements, and

Fig. 2 is a perspective view showing the method of holding or bending the hat sweat and the forming of the over-edge stitches therethrough.

The invention is directed broadly to a hat sweat having edge covering stitches, the loops of which are passed through the body portion of the hat sweat at a considerable distance back from the edge of the hat sweat. These loops are brought to the edge of the hat sweat and extend a short distance beyond said edge. The thread in which the loops are formed is likewise brought to the edge of the hat sweat and a slight distance therebeyond. The looper thread passes through the needle thread loops laid at the edge of the hat sweat and around the shank of the next needle loop, so that said looper thread may be drawn taut and will pass straight along the edge of the hat sweat and will be woven with the needle thread loops.

Referring more in detail to the drawings, my improved hat sweat is indicated at 1 in the drawings. The edge covering stitches are indicated at 2. These covering stitches are formed from the needle thread 3 and the looper thread 4. The needle thread is carried by a needle 5, and the looper thread is carried by a looper 6. The hat sweat 1 is bent along the line 7 which is some distance back from the free edge 8 of the hat sweat, and this bent portion of the hat sweat is deflected so as to lie substantially parallel with the path of the needle 5, which needle moves in a horizontal plane. The needle passes underneath the bent portion of the hat sweat, and penetrates said hat sweat at points 9, 9. The looper 6 has an oscillating movement so as to enter the needle thread loop where the needle emerges from the hat sweat. Said looper is then moved laterally across the free edge 8 of the hat sweat, and is depressed so that the needle 5 will pass between the looper thread 4 and the body portion 10 of the looper. The needle passes between the thread and the body of the looper when it moves forward to enter the hat sweat for the next stitch. The looper is then retracted, and the looper thread is left encircling the needle 5. When the needle is withdrawn from the hat sweat, it will likewise withdraw from between the looper and the looper thread and will leave the shank of the formed needle loop lying over the looper thread. As has already been noted, the looper moves through the needle loop when it first emerges from the hat sweat, and of course, leaves a loop therein. The threads are now so interlocked, that when the stitches are set with considerable tension on the looper thread, said looper thread will be laid straight and substantially taut along the edge of the hat sweat. The looper thread is woven, so to speak, into the overedge threads passing over adjacent strands 11, 11 of the thread loops, and underneath the

shank portion 12 of a needle thread loop. The edge of the hat sweat is covered by the needle thread loops on one side and the shank of the needle thread loops on the other side, plus the connecting needle thread loop extending from one stitch formation to the next stitch formation. The needle thread loops are carried to the edge of the hat sweat and a little beyond, while the shanks are likewise laid on the other face of the hat sweat. Thus it is that the looper thread may join or tie together the needle thread loops and the shanks of the needle threads with the connecting thread between adjacent stitches. The threads are thereby firmly secured to the hat sweat, and are well anchored therein because the needle penetrated the hat sweat a considerable distance back from the edge thereof. The needle thread covers to quite an extent both of the side faces of the hat sweat, and the looper thread lies as a substantially straight continuous thread along the edge of the hat sweat. By the bending of the hat sweat as above described, the needle, without any lateral vibration therein, is caused to enter the hat sweat well back from the edge of the hat sweat, and at the same time, cooperate with the looper, both at the point where it emerges from the hat sweat and at the edge of the hat sweat.

While the invention is particularly adapted for overedging a hat sweat so that it may be secured to the body portion of the hat through the aid of the overedge stitches, the covering stitches are very neat and form a continuous edging for the material, and therefore, the invention is not limited to the particular use stated. It may be used for covering the edges of fabrics for other purposes.

One of the essential features of the covering seam or stitches for the edge of a fabric, is the simplicity of manufacture, and at the same time, the deep anchoring of the thread loops back from the edge of the fabric. Another essential feature consists in the arrangement of the bites of the loop against one face of the fabric so that they project slightly beyond the edge, and the shanks of the loops against the other face of the fabric with the thread connecting or forming successive loops slightly beyond the edge, so that the bites of the loops and the shanks of the loops may be tied or woven together and locked by the looper thread which lies straight along and slightly beyond the edge of the material being covered.

This application is a division of my copending application Serial No. 730,015, filed August 4, 1924, wherein a machine has been disclosed in detail for carrying out the process of forming the edge covering. Reference may be made to said application for a further description of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is—

1. The process of forming an edge covering for fabrics which consists in bending the edge portion of the fabric to a position at an angle to the body portion of the fabric and covering the edge of said bent portion by passing a threaded needle along the lower face of said bent portion of the fabric and penetrating the fabric substantially at the bend in the fabric, laying the needle thread loops which emerge from the fabric against the upper face of the bent portion with the bites thereof at the edge of the fabric, laying the shanks of the needle thread loops against the lower face of the bent portion, and securing the shanks of the loops and the thread portions connecting the same to the bites of the needle thread loops by the looper thread which lies straight and along the edge of the fabric passing underneath the shank portions of the loops and over the bite portions thereof.

2. The process of forming an edge covering for a hat sweat consisting in bending the edge portion of the leather of the hat sweat at an angle to the body portion of the hat sweat and passing a threaded needle under the lower face of said bent portion and through the hat sweat substantially at the bend therein, passing a threaded looper through the needle thread loops after they emerge from the hat sweat, and manipulating said looper and needle so as to lay the needle thread loops against the face of the fabric from which they emerge, with the bites of the loops at the hat sweat edge, and laying the shanks of the needle thread loops against the other face of the fabric, with the thread portions connecting the shanks at the edge of the fabric, and with the looper thread lying straight along the edge of the hat sweat, passing underneath the shank portions of the loops and over the bite portions of the loops for securing the same together.

3. The process of forming an edge covering for fabrics which consists in passing a threaded needle along one face of the fabric and through the fabric at a distance back from the edge thereof, laying the needle thread loops which emerge from the fabric against the other face of the fabric, with the bites thereof at the edge of the fabric, laying the shanks of the needle thread loops against the first-named face of the fabric, and securing the shanks of the loops and the threaded portions connecting the same to the bites of the needle thread loops by a looper thread which lies straight along the edge of the fabric passing along one side of the shank portions of the loops and along the opposite side of the bite portions.

4. An edge covering for fabrics consisting of thread loops passing through the fabric

back from the edge thereof, wherein the bites of the loops are laid on one face of the fabric and project beyond the edge thereof, while the shanks of the thread loops are laid against the other face of the fabric and extend beyond the edge thereof so that the connecting threads of the loops lie beyond the edge of the fabric, and a looper thread securing the bites of said loops to the shanks thereof, said looped thread lying in a straight line along the edge of the fabric and slightly beyond the edge thereof and passing under the shank of one loop and over the bite of the same loop.

In testimony whereof, I affix my signature.

CHARLEY THEROUX.

July 26, 1960 J. D. BOZZA 2,946,069

METHOD OF MANUFACTURING MOCCASINS

Filed Dec. 17, 1956 4 Sheets-Sheet 1

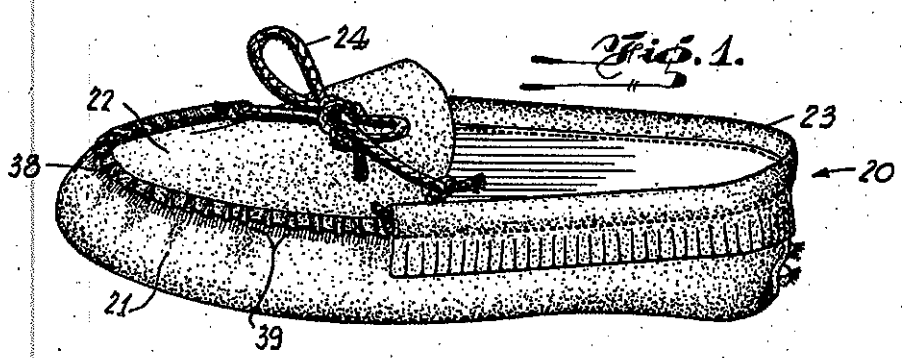


Fig. 1.

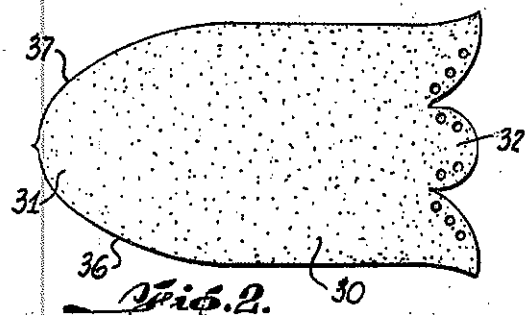


Fig. 2.

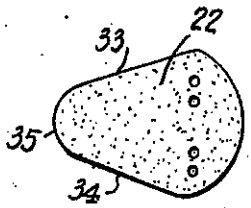


Fig. 3.

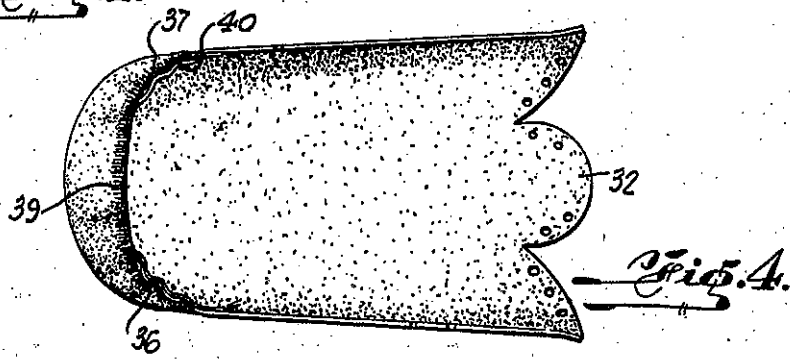


Fig. 4.

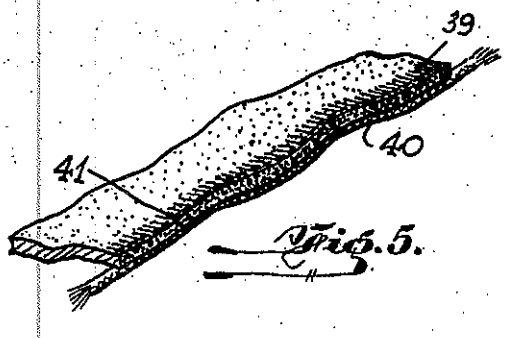


Fig. 5.

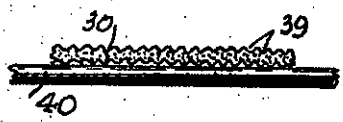


Fig. 9.

INVENTOR.
JOSEPH D. BOZZA
BY
Darby & Darby
ATTORNEYS

July 26, 1960 J. D. BOZZA 2,946,069

METHOD OF MANUFACTURING MOCCASINS

Filed Dec. 17, 1956 4 Sheets-Sheet 2

Fig. 6.

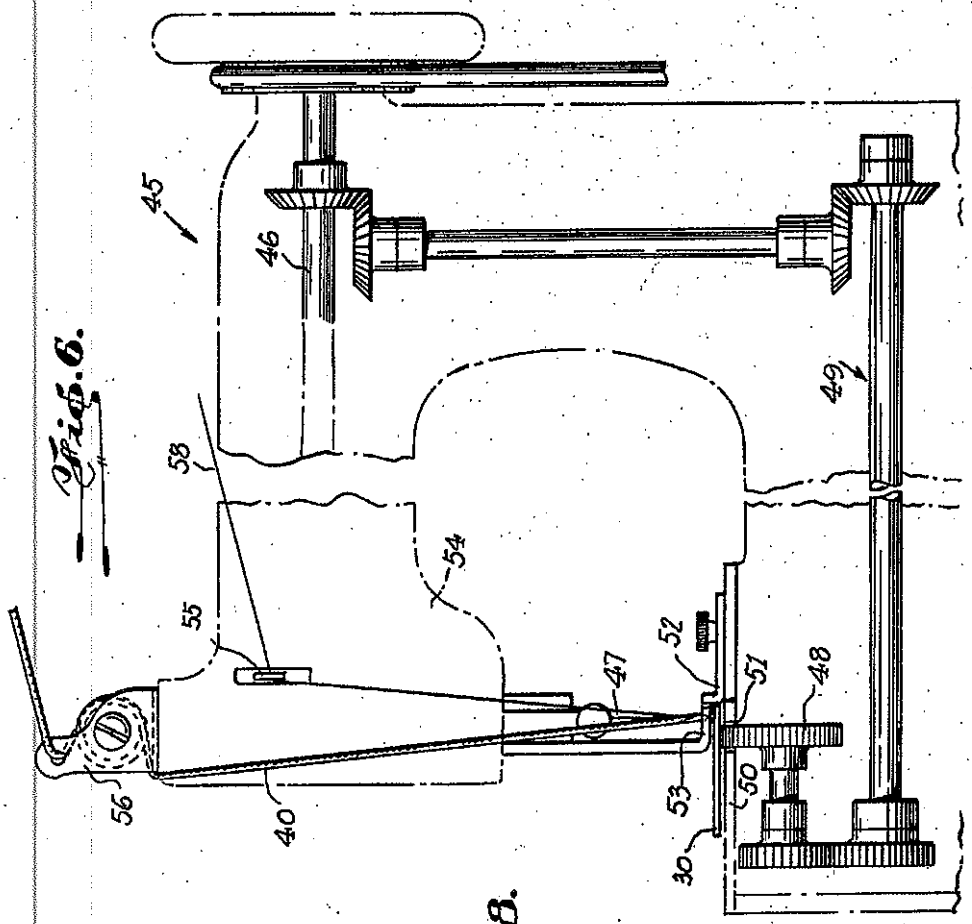


Fig. 7.

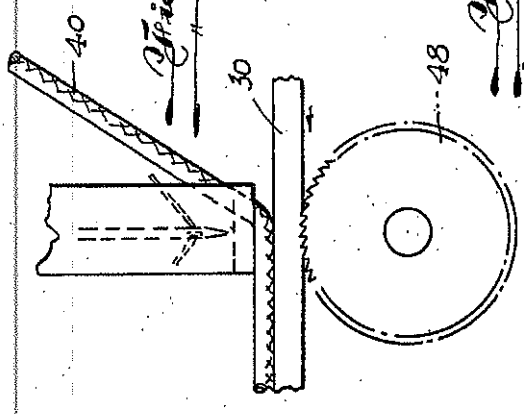
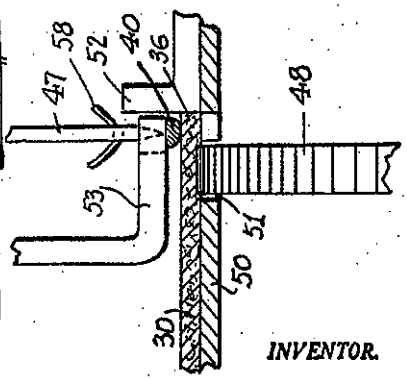


Fig. 8.



INVENTOR.
JOSEPH D. BOZZA
BY
Darby & Darby
ATTORNEYS

July 26, 1960 J. D. BOZZA 2,946,069

METHOD OF MANUFACTURING MOCCASINS

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Fig. 10.

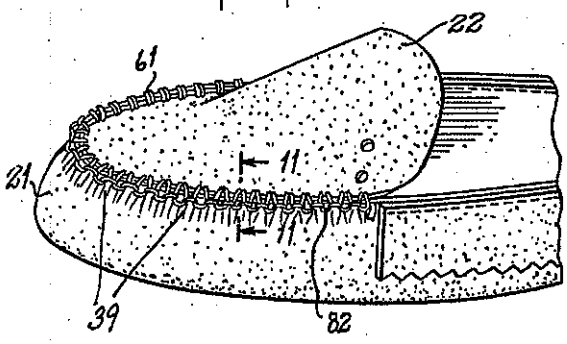


Fig. 11.

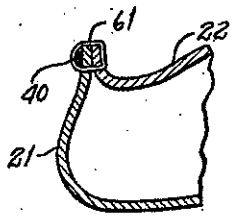


Fig. 12.

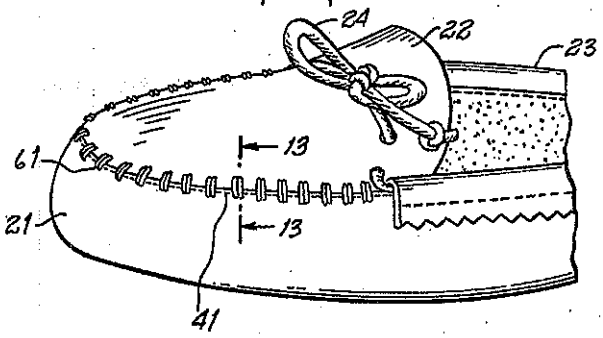


Fig. 13.

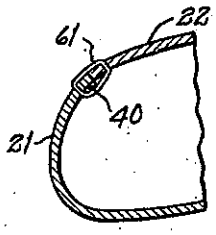
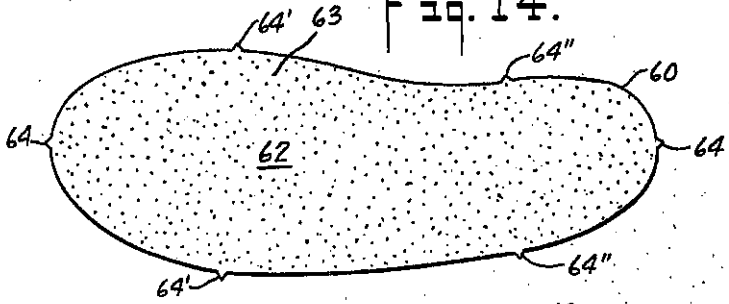


Fig. 14.



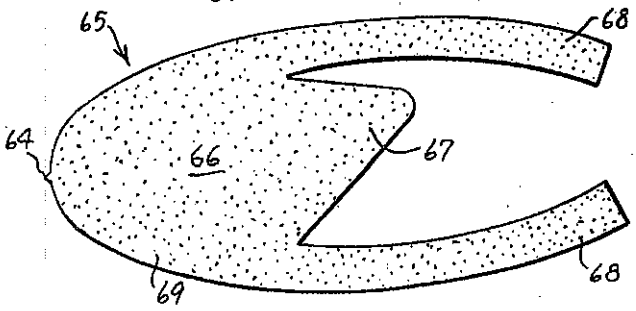


Fig. 15.

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METHOD OF MANUFACTURING MOCCASINS

Filed Dec. 17, 1956 4 Sheets-Sheet 4

Fig. 16.

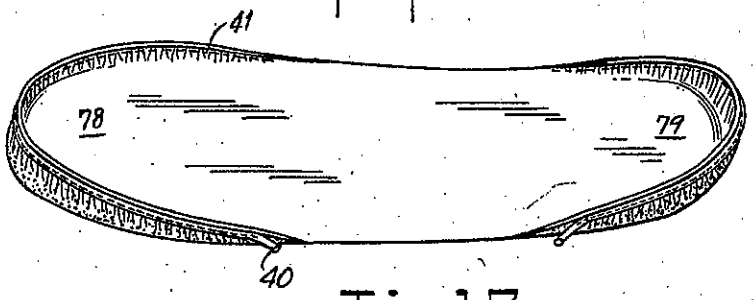


Fig. 17.

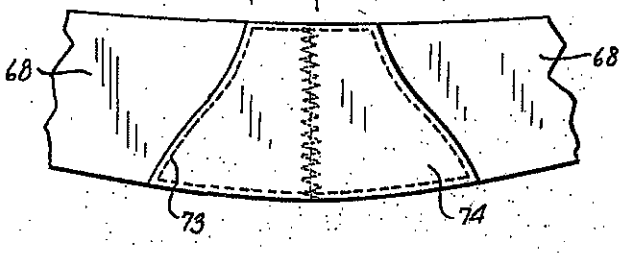
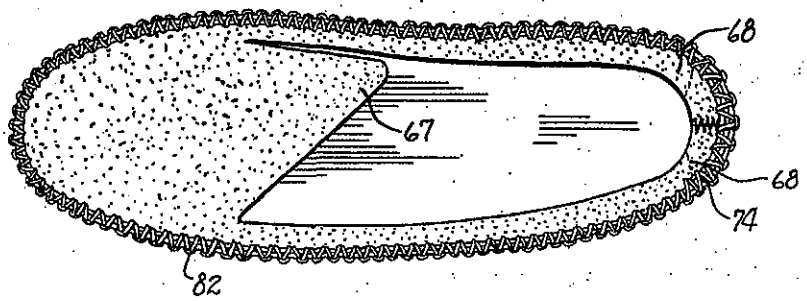


Fig. 18.



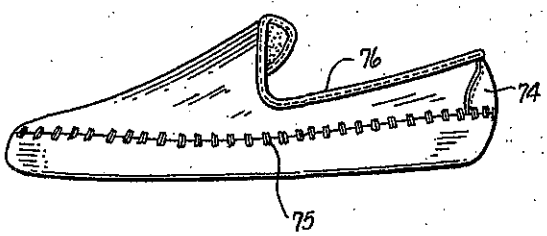


Fig. 19.

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United States Patent Office 2,946,069 Patented July 26, 1960

2,946,069

METHOD OF MANUFACTURING MOCCASINS

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Filed Dec. 17, 1956, Ser. No. 628,928

8 Claims. (Cl. 12—142)

The present invention relates generally to the manufacture of moccasin footwear and is particularly directed to manufacture of moccasin footwear having an improved vamp construction resulting from novel methods of manufacture. The present application is a continuation-in-part of my prior application Serial No. 391,458, filed November 12, 1953, for Method for Securing Together Moccasin Vamps and Plugs, which issued as Patent No. 2,774,087 on December 18, 1956.

Specifically, in one form, the invention relates to the manufacture of a true moccasin by novel means that not only completely eliminate the onerous handwork until now inherent, but do so at greatly reduced costs while yet enhancing the overall appearance of the shoe.

A true moccasin in which the sole and vamp portions are included in a single continuous piece of material brought together with an instep part or plug, has forever preseuted the problem of reducing the much greater peripheral length of the vamp piece down to coincide with the smaller peripheral length of the plug, so that the two can then be properly secured, thus forming the complete shoe.

Heretofore, this transformation was accomplished either by hand lacing, wherein the outer edge of the vamp was gathered, stitch by stitch, to the plug, or by means of various other ways known in the patented art, such as cementing the parts together to hold until sewing; molding the vamp piece with heat and pressure devices to force its perimeter to coincide with the line of the smaller plug; or, in a more recent patent, fastening the plug and vamp together by hand lacing as always but then stitching by machine underneath so that the original lacing margin could finally be trimmed off the top.

Other methods which have been employed to simulate the true moccasin effect are legion. One in particular takes notches out of the front line of the vamp, then sews together the open "V's" thusly drawing up the vamp to meet with the plug line. Another completely cuts out that part of the vamp piece which normally would become the sole in a genuine moccasin, and stitches in the plug first, since now the two lines will coincide, after which the sole is either sewed or cemented in place. These, of course, are only imitations.

The present invention, however, in one of its aspects, brings a true one-piece vamp and sole member to the proper size for exact juxtaposition with the plug in one simple sewing operation. The two parts are then fastened together with an overlapping type of machine stitch, which most neatly produces the effects of hand-sewing. When this shoe is completed it presents a much dressier, more uniform type of moccasin than ever possible by hand, and does so with great economies because of saving of time and reduction in required skill of the workman.

The present invention also relates to further improved methods of fabricating moccasin constructions having a greatly enhanced appearance and fit over conventionally produced moccasins, while retaining the advantages of

simplicity and economy of machine manufacture. These further constructions are producible by adaptations and extensions of the method described and claimed in my said Patent No. 2,774,087.

According to one feature of the present invention, the sole piece and the upper piece (which may be or may include a plug piece or its equivalent) are first secured together in reverse relation, and thereafter turned inside out to place their edges in abutting relation to form an essentially smooth joint between the two pieces.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings which form a material part of this disclosure.

The invention accordingly consists in the features of construction, combinations and arrangements of elements and method steps, which will be exemplified in the construction hereinafter described, and of which the scope will be indicated by the appended claims.

In the drawings:

Fig. 1 is a perspective view showing one form of true one-piece moccasin constructed in accordance with some of the features of the present invention.

Fig. 2 is a plan view showing a one-piece sole and vamp blank before assembly in the moccasin of Fig. 1.

Fig. 3 is a plan view showing a plug blank before assembly in the moccasin of Fig. 1.

Fig. 4 is a plan view showing the one-piece sole and vamp blank in Fig. 2 in an intermediate stage of manufacture.

Fig. 5 is an enlarged, fragmentary perspective view showing a detail of the construction of the moccasin of Fig. 1.

Fig. 6 is a front elevational view, partly broken away and partly in dot-and-dash outline, showing a sewing machine adapted for use in the practice of the present invention.

Fig. 7 is a fragmentary view of the sewing machine of Fig. 6 showing the manner of operating the latter in the practice of the present invention.

Fig. 8 is a fragmentary front elevational view of the elements shown in Fig. 7.

Fig. 9 is a fragmentary, greatly enlarged view showing in detail a feature of construction of one embodiment of the present invention.

Fig. 10 is a fragmentary perspective view of an intermediate stage of manufacture of a modification of the moccasin structure of Figs. 1–5 and 9, with a different manner of joining the plug to the one-piece sole and vamp blank.

Fig. 11 is a fragmentary view of a portion of the construction of Fig. 10, showing a cross-section of the seam thereof.

Fig. 12 is a fragmentary perspective view showing a true moccasin constructed in accordance with the modification of Figs. 10 and 11.

Fig. 13 is a fragmentary sectional view of the construction of Fig. 12 showing the seam thereof.

Fig. 14 is a plan view showing a one-piece lower blank for a further modified form of moccasin construction, the blank serving to form the sole and part of the vamp of the completed moccasin.

Fig. 15 is a plan view showing an upper blank to be used together with the blank of Fig. 14, and forming a portion of the vamp and the upper (including a plug piece) of the modified form of moccasin.

Fig. 16 is a top perspective view showing the blank of Fig. 14 in an intermediate stage of manufacture and before assembly in the completed moccasin.

Fig. 17 is a fragmentary view of a portion of the blank of Fig. 15 in an intermediate stage of manufacture and before assembly in the completed moccasin.

Fig. 18 is a top view of the blanks of Figs. 16 and 17 sewn together in an intermediate stage of manufacture.

Fig. 19 is a side view of the complete modified moccasin construction according to Figs. 14–18.

Referring now more particularly to the drawings, the embodiment of the invention illustrated therein comprises a moccasin, generally designated 20, including a sole, a vamp or upper 21, a plug 22 secured in the fore part of the vamp, and a collar 23 extending along the edge of the vamp rearwardly of the plug 22 and enclosing the lace 24.

The vamp 21 is formed from the blank 30 which has a curved front portion 31 and a scalloped rear portion 32. The margin of the front portion 31 is adapted to be drawn up from the sole portion to form the moccasin vamp or upper 21, the rear portion 32 being laced or otherwise secured together to form the moccasin back. The fore part of plug 22 is then arranged with its diverging edges 33 and 34 and front curved edge 35 secured to the drawn-up front edges 36 and 37 of the vamp and sole blank 30, as by the stitching 38.

More particularly, the curved front edges 36 and 37 of the blank 30 are provided with a plurality of relatively minute, contiguous substantially uniform gathers or crimps 39, and a cord or tape 40 is secured along the gathered edges 36 and 37 by stitching 41, to permanently retain the curved front edges of the blank 30 in their gathered condition and the front margins of the blank drawn up.

The cord or tape 40 must be non-elastic, or inextensible, providing a maximum of restraining force.

In Figs. 6, 7 and 8 are illustrated the preferred manner of manufacturing the above described moccasin. A sewing machine, generally designated 45, includes a drive shaft 46 which is operatively connected to the sewing needle 47, and which is also operatively connected to the serrated or toothed feed roll or wheel 48 for driving the latter through the gear train, generally designated 49. The sewing machine 45 further comprises an operating table or working plate 50 having a through aperture 51 for receiving the upper portion of the feed wheel 48, and a work guide 52 adjustably mounted on the working plate 50. A presser foot 53 is disposed above the aperture 51 and feed wheel 48, and is adjustably mounted in the sewing machine arm 54. A thread loop is provided on the sewing machine arm 54, as at 55, and a suitable cord tensioning device 56 is also mounted on the sewing machine arm.

In practicing the present invention, the leather or other material being operated on, the blank 30 in this case, is arranged on the work table 50 with its edge 36 abutting the guide 52 so that the edge portion is disposed over the feed wheel 48 and beneath the presser foot 53. In the conventional manner, a thread 58 extends through the loop 55 and through the needle 47, the latter being vertically reciprocable through the presser foot 53. The usual bobbin, not shown, is under the table 50 to engage thread 58 to form the stitches. A cord or tape 40 extends through the tensioning device 56 and under the presser foot 53, which holds the cord in frictional engagement with the upper surface of the leather 30. Thus, the cord 40 extends between the presser foot 53 and the leather 30 and through the path of the needle 47.

In operation, the needle 47 reciprocates vertically and the feed wheel rotates in a counterclockwise direction, as seen in Fig. 7. The serrations or teeth of the feed roll 48 frictionally engage with the underside of the leather 30 to move the latter in the direction of the arrow. The presser foot 53 holds the cord or tape 40 firmly against the upper surface of the leather 30 in frictional engagement with the latter, so that the cord would normally be moved along with and is sewn to the leather. However, the cord is held back or restrained, preferably resiliently, by the tensioning device 56. As the feed roll 48 is positively driven, and as the teeth positively and frictionally engage with the leather 30, it will be apparent that the feed wheel teeth will serve to crimp or gather the more slowly moving leather 30. During this operation, the cord 40 is held taut by the tensioning device 56 and fixedly secured to the crimped or gathered leather 30 by the stitching action of the needle 47. Thus, upon removal of the leather 30 and its attached cord or tape 40, it is seen that the edge portion of the leather will be permanently retained in its gathered or crimped condition by the attached cord.

Further, the above described crimping or gathering action will serve to draw up the marginal portion of the originally flat blank 30 so as to properly form the upper toe portion of the moccasin as a pocket. If it is desired to vary the amount of crimping or gathering effected by the above described operation, and hence the degree of drawing up of the marginal portion of the blank 30, it is only necessary to increase or decrease the tension under which the cord 40 is held during the stitching process. That is, with the cord 40 under greater tension, the retardation of the leather 30 will be increased and thereby effect increased gathering or crimping action to deepen the hollow pocket. Conversely, when the cord tension is decreased, the gathering action and the degree of marginal drawing up will be decreased.

The desired amount of drawing up is determined by the peripheral length of the plug 22 so that the edges 33, 34, and 35 of the latter will just fit within the reduced periphery formed by the drawn-up edges 36 and 37 of the blank 30. The plug may then be stitched into place by an overlapping stitch sewing machine (also sometimes called an over-edge sewing machine) or other suitable means, preferably to simulate hand stitching, after which the collar 23 is attached, and the back of the shoe is closed in any desired manner.

Referring to Figs. 10–13, the present invention also includes a modified form of construction and method of fabrication, in which by minor changes in steps from the method described above, a genuine moccasin is formed without the ridged seam extending around the plug as in the case of the embodiment shown in Fig. 1.

The method followed to form this modified construction starts with the blanks of Figs. 2 and 3, the one-piece sole and vamp blank of Fig. 2 being gathered together at its toe end and sewn to the cord as described above and shown in Fig. 4. The present modification resides in the manner in which the plug blank of Fig. 3 is assembled to the sole and vamp blank of Fig. 4.

In this modified construction, the processed blank of Fig. 4 is assembled with and sewn to the plug blank 22 in the same manner as in Fig. 1 but in an inside-out condition: that is, the cord 40 is on the outer face of the pocket 29 formed in the toc portion of the blank 30, and the plug 22 is placed within the pocket formed in the vamp blank 30, with its inside surface facing outwardly and with the edges 33 and 34 of the plug 22 and its front edge 35 placed flat against and aligned with the front edges 36 and 37 of the sole and vamp blank 30. In this position what will ultimately become the outwardly facing surfaces of the plug, sole and vamp are flat together in juxtaposition. In this position the vamp and plug are sewn together in a conventional simple overlapping or over-edge type of sewing machine, such as Singer Model 176–34 machine. The resultant intermediate stage of the manufacture thus obtained is illustrated in Figs. 10 and 11. Each stitch then has a single thread running through the vamp and plug pieces, and the locking loop 82 of each stitch is then preferably located on the side where the cord 40 is located. This unfinished product is then turned inside out. In so doing, the stitches finally appearing on the outside will then appear as short straight threads 61 extending substantially vertically and in parallel spaced relation around the sewn periphery of the plug.

In addition, by suitably selecting the tightness of stitching, the edges of the vamp and plug can be made to abut

rather than to overlap or be parallel, so that the plug forms a smooth continuation of the vamp and is joined thereto by the stitches 61, shown in Figs. 12 and 13.

The stitches 61 can thus be made part of the decorative aspect of the moccasin. The plug 22 and the vamp 21 may be made of contrasting materials or colors, and the stitches may be made to contrast with the materials of the plug and vamp so as to add a decorative aspect to the moccasin.

The moccasin of Fig. 12 is then finished in the same manner as shown in Fig. 1, with a collar 24 extending around the remaining portion of the vamp 21 to which the plug 22 is not sewn. A lace 24, not shown, may be added.

In moccasins of the type described above, the vamp along the side of the foot, particularly at the arch of the foot, is formed of the same piece of material as the sole. This material while flexible, is not elastic, and accordingly cannot conform well to the foot, particularly around the arch and the side of the foot. Accordingly, in conventional moccasins as well as in the moccasins described above, there is no close conformity between the moccasin and the foot at the arch or side of the foot intermediate the toe and heel portions.

The further modified construction shown in Figs. 14 through 19 overcomes this, and provides a construction which conforms more closely to the foot while permitting further decorative aspects to be added or included. It further contributes a "swivel action" which maintains the moccasin in better conformity with the foot during walking.

In this modified construction, a line of stitching similar to that shown at 61 in Fig. 12, is utilized not only around the part of the moccasin corresponding to the junction between the plug and the vamp but also completely around the sides and back. In effect, the regular vamp and upper is separated horizontally into two sections, one above the other. For this purpose only the lower part of the vamp and upper is integral with the sole. The upper part of the vamp is integral with the plug and is continued integrally around the back and sides of the moccasin as part of the upper. Nevertheless, since the sole is integral with the lower vamp portion and with the lower part of the shoe upper, the genuine moccasin construction is retained. This will be more clearly apparent from Figs. 14 and 15 which show respectively the flat sole blank and the flat upper blank.

The flat sole blank 60 generally conforms to the outline of the foot or the impression of a foot on a flat surface. The center portion 62 forms the sole of the completed moccasin while the periphery 63 forms part of the lower portion of the vamp and upper as will be described. Locating tips or points 64 may be formed in each blank 60 or 65 to assist in the further steps of fabrication.

The upper blank, 65, shown in Fig. 15 includes a front-central portion 66 serving the same function as the plug of the previous construction. This plug portion 66 is nearly surrounded by a peripheral portion 69 forming the upper part of the vamp of the completed moccasin. The tongue portion 67 is contiguous with the plug portion 66, and a pair of strips or tabs 68 extending backwardly from the peripheral vamp portion 69. These strips 68 form part of the upper of the completed moccasin.

The blank of Fig. 14 is processed in a manner similar to that shown in Fig. 4 and described above to form a pocket around the toe portion between the two locating points 64' and to form a second similar pocket between the two locating points 64'' of the heel portion. This is shown in Fig. 16, showing the toe pocket 78 and the heel pocket 79 formed in the sole blank 60. As in the case of Fig. 4, the cord 40 is sewn near the peripheral edge of each of the pockets 78 and 79 to retain it in position.

The upper blank 65 first has the ends of its strips 68 sewn together in abutted fashion by conventional zig-zag stitching 73, as shown in Fig. 17, and this seam is then reenforced by a reenforcing piece 74 sewn to both strips 68 and illustrated again in Fig. 17. In this way the back is closed.

The two operations illustrated in Figs. 16 and 17 are designed so that the periphery of the partially formed blank 60 of Fig. 16 is equal to that of the partially formed blank 65 of Fig. 17. These two partially formed blanks are then juxtaposed with their edges aligned and with what will be their outer surfaces flat against one another. In effect the blank 65 of Fig. 17 is placed inside the blank 60 of Fig. 16 with their edges aligned and their surfaces in contact. The two blanks are then sewn together about their complete periphery in the same manner as described with respect to Fig. 10 with an over-edge or overlapping stitch. The article thus formed is shown in Fig. 18. It is then turned inside out and the edges of the two blanks are made to abut one another so that the upper blank forms a smooth continuation of the sole blank as seen in Fig. 19. The blanks are so cut that the line of stitching 75, as shown in Fig. 18, extends completely around the entire side of the foot, and preferably uniformly spaced above the sole, so that an ornamental row of parallel stitching as shown in Fig. 19 appears completely encircling the moccasin.

Because of the fact that part of the vamp is integral with the sole blank, and part is formed of the upper blanks by suitably shaping or designing the shapes of the edges of the blank, the moccasin may be made to conform more closely to the arch and side of the foot intermediate the toe and sole portions than was formerly the case when the vamp and sole were one piece. As a result a better fitting and better appearing article of footwear is produced while preserving all the advantages and desirable appearance of the genuine moccasin, since the sole is integral with the vamp. In addition, the line of stitching provides a hinging or swiveling action between the two pieces of the moccasin, which causes the moccasin to remain in better relation with the foot during flexure in wearing and walking.

To finish off the remaining cut edges of the upper blank a suitable edging 76 may be sewn completely around the aperture formed by the upper part of the blank and the top. Socklinings, innersoles, outersoles and heels may be attached as desired. This article of footwear therefore not only lends itself to the simple processes and steps described above, requiring no handstitching whatever, but in addition provides a better fitting moccasin which can be fabricated for style in two-tone effects and with a desirable ornamental appearance.

It will be understood that the novel features of the present invention may be employed in connection with genuine moccasins with or without hard soles, such construction being omitted from the drawings for purposes of clarity.

From the foregoing, it is seen that the present invention fully accomplishes its intended objects, and provides a construction and method of manufacture which are well adapted to meet practical conditions of use.

Although the present invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be made within the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. The method of manufacturing footwear from a first relatively highly flexible piece having a sole portion and a portion extending upwardly therefrom to form part of an upper, and from a second piece providing a further part of said upper, said method comprising the steps of forming a toe pocket in said first piece with the ultimately inside surface of said pocket facing outwardly, securing said second piece to said first piece about the periphery of said pocket with the respective edges of

said pieces in contiguous edge-to-edge alignment under tension appropriate to permit said pieces being turned into edge-abutting relationship and with said second piece having its ultimately outside surface in face-to-face relationship with the ultimately outside surface of said first piece, and turning the article thus made inside out to place said pieces in said edge-abutting relationship.

2. The method of manufacturing footwear as in claim 1, wherein said step of forming said pocket comprises forming a plurality of contiguous substantially uniform gathers along the edge of said first piece in the toe region thereof, and retaining said gathers by securing a substantially inelastic cord along one face of said first piece edge and wherein said step of securing said second piece to said first piece comprises sewing said piece together by stitches at least partially encompassing said inelastic cord.

3. The method as in claim 2, wherein said retaining step comprises stitching said cord continuously along said gathered edge.

4. The method of claim 1, wherein the step of securing said second piece to said first piece is performed by sewing through both said pieces with an over-edge stitch.

5. The method of manufacturing footwear from a flexible first piece having a sole portion and an integral portion extending upwardly therefrom and entirely thereabout to form part of an upper and from a second piece providing a further part of said upper extending entirely around said footwear, said method comprising the steps of forming a toe pocket and a heel pocket in said first piece with the ultimately inside surface of said pockets facing outwardly, securing said second piece to said first piece by stitching about the entire periphery of said first piece with an overedge stitch with the respective edge of said pieces in contiguous edge-to-edge alignment under tension appropriate to permit said pieces being turned into edge-abutting relationship and with said second piece having its ultimately outside surface in face-to-face relationship with the ultimately outside surface of said first piece, and turning the article thus made inside out to place said pieces in said edge-abutting relationship with each of said pieces forming a substantially smooth continuation of the other while permitting both said pieces substantially separately to conform to movements of the foot of the wearer by hinging action of said stitching.

6. The method of manufacturing footwear from a first relatively highly flexible piece having a sole portion and a portion extending upwardly therefrom to form a part of an upper, and from a second piece providing a further part of said upper, said method comprising the steps of forming a toe pocket in said first piece with the ultimately inside surface of said pocket facing outwardly, sewing said second piece to said first piece about the periphery of said pocket with the respective edges of said pieces in contiguous edge-to-edge alignment and with said second piece having its ultimately outside surface in face-to-face relationship with the ultimately outside surface of said first piece and with a stitch having locking loops on the then outside of said pieces and under tension appropriate to permit said pieces being turned into edge-abutting relationship, and turning the article thus made inside out to place said pieces in said edge-abutting relationship with said locking loops on the interior of said article.

7. The method of manufacturing footwear from a first relatively highly flexible piece having a sole portion and a portion extending upwardly therefrom to form part of an upper, and from a second piece providing a further part of said upper, said method comprising the steps of forming a toe pocket in said first piece with the ultimately inside surface of said pocket facing outwardly, placing said second piece against said first piece with the respective edges of said pieces in contiguous edge-to-edge alignment and with said second piece having its ultimately outside surface in face-to-face relationship with the ultimately outside surface of said first piece, sewing said second piece to said thusly placed first piece about the periphery of said pocket with a type of stitch having locking loops on the then outside of said pieces and with a tension appropriate to permit said pieces being turned into edge-abutting relationship, and turning the article thus made inside out to place said pieces in said edge-abutting relationship with said locking loops on the interior of said article.

8. The method of manufacturing footwear from a first relatively highly flexible piece having a sole portion and a portion extending upwardly therefrom to form part of an upper, and from a second piece providing a further part of said upper, said method comprising the steps of forming a toe pocket in said first piece with the ultimately inside surface of said pocket facing outwardly, said step including forming a plurality of gathers along the edge of said first piece in the toe region thereof and retaining said gathers by securing a substantially inelastic cord along the ultimately inside surface of said first piece adjacent the edge thereof, placing said second piece against said first piece with the respective edges of said pieces in contiguous edge-to-edge alignment and with said second piece having its ultimately outside surface in face-to-face relationship with the ultimately outside surface of said first piece, sewing said second piece to said thusly placed first piece about the periphery of said pocket with an overlapping stitch at least partially encompasing said cord and having locking loops on the then outside of said pieces and with a tension appropriate to permit said pieces being turned into edge-abutting relationship, and turning the article thus made inside out to place said pieces in said edge-abutting relationship with said locking loops and said cord on the interior of said article.

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SEWN DIAPER WITH NON-RAVELING STITCHING

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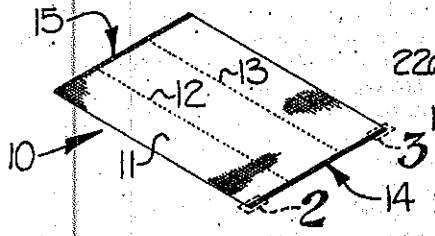


Fig-1

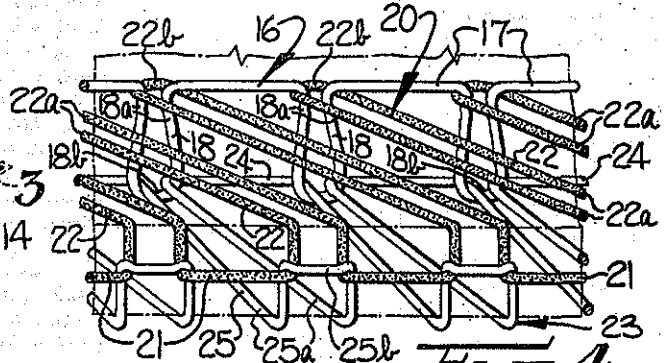


Fig-4

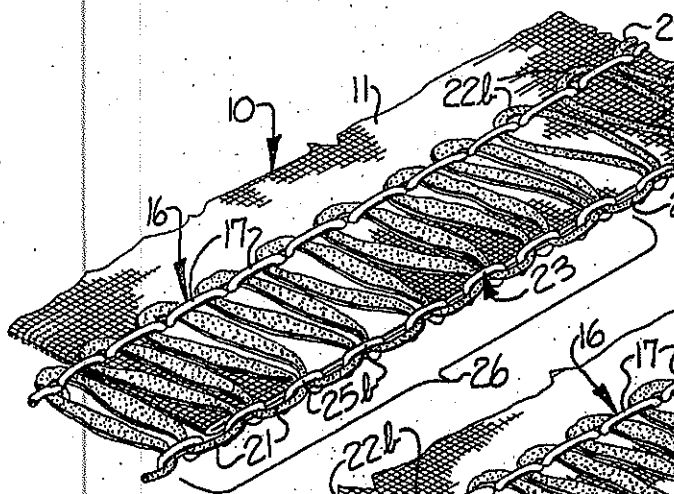


Fig-2

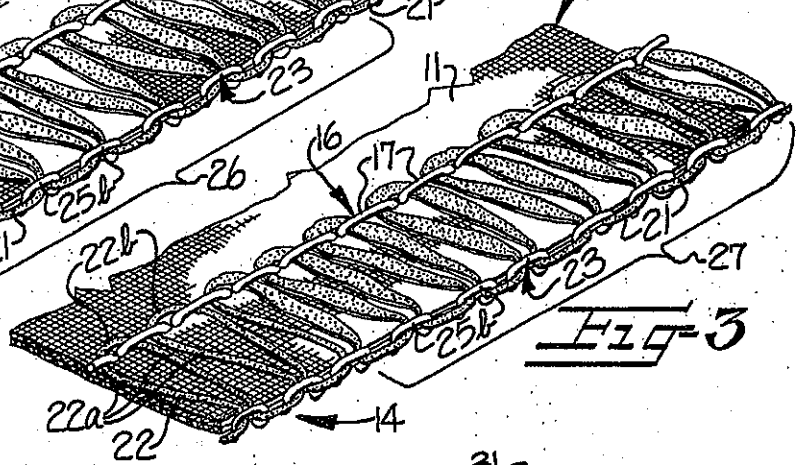


Fig-3

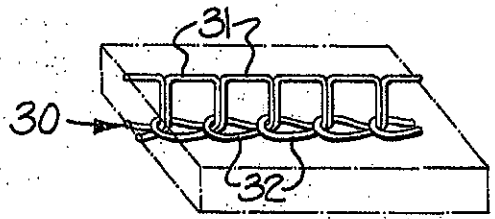


Fig-6

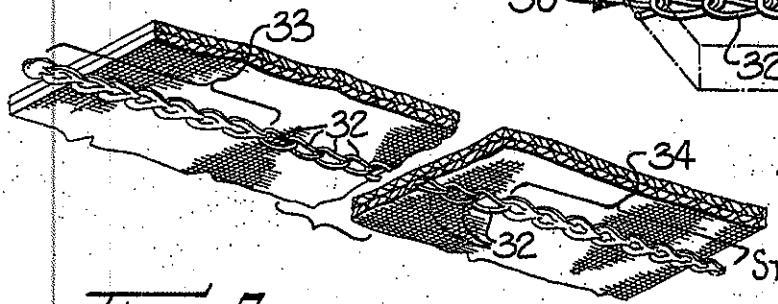


Fig-5

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ATTORNEYS

United States Patent Office

3,424,161

Patented Jan. 28, 1969

3,424,161

SEWN DIAPER WITH NON-RAVELING STITCHING

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U.S. Cl. 128—284 3 Claims

Int. Cl. A61f *13/18;* D05b *17/00;* B32b *7/08*

ABSTRACT OF THE DISCLOSURE

A prefold diaper formed of cut and folded woven fabric and having lines of overedge stitching extending along and over the cut edges of the folded fabric to finish these edges and impart anti-ravel characteristics thereto, each of the lines of stitching including a plurality of interlocking threads, one of which consists essentially of thermoplastic material and at least one other of which is formed of non-thermoplastic material. The thermoplastic thread of each line of stitching has portions extending along one face of the fabric generally perpendicular to the edge and these portions are fused to the fabric and also to the interlocking portions of the non-thermoplastic thread to anchor the stitching and prevent raveling thereof during normal use of the diaper.

The present invention relates to sewn articles, such as prefold diapers, and more particularly to non-raveling stitching for such articles.

In the formation of certain articles from sheet material, the stitching thereof is well known for various and sundry purposes, including joining several layers of sheet material together, the hemming of pieces of sheet material and the finishing of cnt edges by overedging. This stitching is usually formed by a sewing machine and has portions penetrating through the sheet material and interlocking with other portions thereof on at least one side or face of the sheet material.

Such stitching is subject to raveling during use of the sewn article, particularly at the terminal end portions thereof, and this raveling problem becomes acute with articles, such as prefold diapers, which are subjected to frequent and repeated laundering. As is well known, prefold diapers are formed by folding a section of diaper fabric into a size and shape adapted to fit an infant without additional folding. The folded diaper has at least one line of stitching penetrating therethrough to secure the same in this folded condition and frequently the cut edges of the diaper fabric are finished by overedge stitching.

Various attempts have been made to stabilize this stitching to prevent raveling thereof, and such attempts have included an operation usually referred to as "tailing" wherein the stitching is continued for some distance outwardly from opposite extremities of the sewn article to form a tail of interlocked threads. Such tails, however, ravel after only a few launderings and, therefore, have not effectively stabilized the stitching.

A procedure commonly referred to as "backtacking" has also been extensively used to reduce the raveling of stitching and is accomplished by reversing the sewing machine feed means adjacent each edge of the article to form a short line of reverse stitching adjacent each end of the stitching. While being moderately successful at reducing the raveling problem, such backtacking is very time consuming and laborious and adds considerably to the cost of manufacture of sewn articles.

Recently, another attempt at a solution to this raveling problem has been proposed. This proposed solution necessitates a special type of thread in the stitching, which thread is formed of a multiplicity of highly crimped filaments. During the sewing operation, this thread is under tension so that the crimp is temporarily removed from the filaments. However, when the thread is cut at the edges of the article, the filaments relax to restore the crimp and the thread "blossoms out" and intertwines to form an enlarged portion or fluffy ball at the end thereof, which prevents the thread from being pulled back through the fabric to prevent raveling of the stitching.

It is, therefore, an object of the present invention to provide a sewn article having one or more lines of stitching which may be of any desired type and which are anchored against raveling even after repeated laundering.

A more specific object of the present invention is to provide a sewn article of the character described wherein the stitching includes an essentially thermoplastic thread which is fused to the article at selected areas of the article including terminal end portions of the stitching to anchor the stitching and prevent raveling thereof.

A further more specific object of the invention is to provide, in a sewn article, a line of stitching anchored against raveling by having a thermoplastic sewing thread thereof fused to interlocking portions of itself or another cooperating sewing thread of the line of stitching.

A still more specific object of the invention is to provide, in a sewn article, a line of stitching anchored against raveling by a thermoplastic sewing thread thereof being fused to the sewn article and to interlocking portions of itself or another cooperating sewing thread.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

FIGURE 1 is a perspective view of a prefold diaper incorporating the features of the present invention;

FIGURE 2 is a fragmentary, enlarged perspective view of the corner of the diaper enclosed within the rectangle 2 in FIGURE 1;

FIGURE 3 is a view similar to FIGURE 2 of the opposite corner enclosed within the rectangle 3 in FIGURE 1;

FIGURE 4 is an enlarged, fragmentary, somewhat schematic perspective detail of the stitching extending along opposite ends of the diaper of FIGURE 1;

FIGURE 5 is an enlarged, fragmentary, perspective view of a sewn article including another type of seam incorporating the features of the present invention; and

FIGURE 6 is a fragmentary, enlarged, somewhat schematic perspective view of a portion of the seam shown in FIGURE 5.

Referring now more specifically to the drawings, there is shown in FIGURE 1 a diaper **10** of the type commonly referred to as prefold diapers, and which is representative of sewn fabrics or articles which may be produced in accordance with this invention. This diaper is formed of fabric **11** which is folded into a size and shape, usually rectangular, adapted to fit an infant.

Diaper **10** has a pair of spaced apart lines of stitching **12, 13** each being preferably continuous and penetrating through the folded fabric **11** and extending longitudinally of the diaper **10** to secure the fabric **11** in folded condition. Lines of stitching **12, 13** may be of any type of straight seam conventionally formed by sewing machines.

Opposite end edges of diaper **10** have suitable lines of preferably continuous stitching **14, 15** of the conventional overedge type extending therealong and thereover to finish these edges and prevent raveling of the fabric therealong and to aid in holding the fabric in the folded condition. This overedge stitching is more particularly shown in FIGURES 2, 3 and 4, which are enlarged details of the line of overedge stitching **14**.

This stitching is illustrated as being formed by three (3)

threads, each of which follows a separate course in the stitching, but it should be understood that the same may be formed of any desired number of threads in any desired arrangement without departing from the scope of this invention. In the illustrated form, stitching **14** includes a needle thread **16** which is disposed inwardly from the end edge of fabric **11** and has first portions **17** extending along one face of fabric **11** and second portions **18** penetrating through the fabric to the opposite face thereof. Portions **18** are in the form of loops having legs **18***a* extending through the fabric and bights **18***b* disposed on the opposite face thereof.

Stitching **14** also includes a first looper thread **20** having first portions **21** extending along and parallel to the end edge of fabric **11** and second portions **22** extending along the aforesaid one face of the fabric **11** and inwardly from and generally perpendicular to the end edge thereof. Second portions **22** are in the form of loops having legs **22***a* and bights **22***b* connecting the inner ends of the legs of each loop. The loop portions **18** of the needle thread **16** penetrate through the loop portions **22** of first looper thread **20** to interlock the two threads.

A second looper thread **23** cooperates with needle thread **16** and first looper thread **20** to form the stitching **14**. Thread **23** includes first portions **24** extending along the aforesaid opposite face of the fabric **11** and inwardly from and parallel to the end edge thereof, and second portions **25** extending outwardly from the portions **24** to the end edge. Portions **25** are in the form of loops having legs **25***a* penetrating through the loop portions **18** of the needle thread **16** to interlock the needle thread and second looper thread, with bights **25***b* connecting the outer ends of the legs **25***a* outwardly of the end edge of the fabric **11**. The legs **22***a* of the loop portions **22** of first looper thread **20** penetrate through the loop portions **25** of second looper thread **23** to interlock the two looper threads.

In accordance with the present invention, lines of overedge stitching **14** and **15** are each formed of at least one thread consisting essentially of a material, such as a thermoplastic material, capable of being fused to the fabric **11** to anchor the thread to the fabric and to prevent raveling of the stitching. An example of a thermoplastic thread which has been used successfully in accordance with this invention is polypropylene, but it should be understood that other thermoplastic threads, including blends or combinations of thermoplastic and non-thermoplastic fibers, may be used. Also, it is preferred that the thermoplastic thread be multi-filament rather than mono-filament because of the increased pliability thereof and therefore increased handling ease in sewing.

While more than one of the threads in the stitching may be thermoplastic, it has been determined that a single thermoplastic thread is usually sufficient, and the remainder of the threads preferably are formed of non-thermoplastic material to avoid any undue stiffening in the stitching and to maintain suppleness in the line of stitching. In most instances, this thermoplastic thread is preferably a looper thread since the looper thread usually has a greater portion thereof exposed on the surface of the fabric than the needle thread, to thus have a greater area for being anchored to the fabric by fusing. Also, due to the looper thread usually being disposed substantially on one side or face of the fabric, the same is more readily subjected to heat for fusing. Further, the looper thread usually engages the needle thread and other threads, if any, on the same side of the fabric to thus be fused to these threads as well as the fabric to provide a more secure anchor for the stitching.

While it has been determined that the thermoplastic thread in the stitching may be fused to the other cooperating sewing threads or to interlocking portions of itself without being fused to the fabric to sufficiently anchor the stitching and prevent raveling thereof with articles requiring infrequent or gentle laundering, it is generally preferred that the thermoplastic thread be fused to the fabric to provide a broader and greater area of anchorage to the

line of stitching. For maximum anchorage of the line of stitching in accordance with the invention, the thermoplastic thread should be fused to both the fabric and other sewing threads or itself, which is preferred for many types of sewn articles requiring repeated and frequent launderings.

As illustrated in FIGURES 2–4, first looper thread **20** of each of the lines of stitching **14**, **15** is formed of thermoplastic material, such as polypropylene, and needle thread **16** and second looper thread **23** are formed of non-thermoplastic material, such as cotton. First looper thread **20** is fused to the fabric **11**, and preferably also to the needle thread **16** and second looper thread **23**, at selected areas of the fabric including the terminal end portions of the stitching at all four corners of diaper **10**, two of which are indicated at **26**, **27** in FIGURES 2 and 3. The fused portions **26**, **27** of the thermoplastic thread extend inwardly from the ends of the stitching for a predetermined distance sufficient to encompass a plurality of stitches for a plurality of the loop portions **22** of looper thread **20** to be fused to the fabric **11**.

The fusion of the thermoplastic thread to the fabric is preferably accomplished by the application of heat thereto sufficient to soften the thermoplastic thread and cause the same to become tacky and to fixedly adhere to the fabric and preferably also to adhere to the other threads of the stitching.

Referring now to FIGURES 5 and 6, there is illustrated therein another type of stitching incorporating the features of the present invention. This stitching is commonly referred to as chain stitching and has perhaps the greatest propensity to ravel of all standard types of stitching.

This chain stitching usually is formed of a single thread **30** which has portions **31** extending along and in engagement with one side or face of the fabric and loop portions **32** penetrating through the fabric and interlocking with each other on the opposite side or face of the fabric.

In accordance with the present invention, thread **30** consists essentially of a thermoplastic material, such as polypropylene, and is fused to the fabric on the side or face thereof having the interlocking loop portions **32** thereon and at selected areas of the fabric including terminal end portions of the stitching, as is indicated at **33**, **34**. The fused portions **33**, **34** of thread **30** preferably extend for a predetermined distance inwardly from opposite ends of the stitching sufficient to encompass a plurality of stitches. As indicated above, the loop portions **32** are also preferably fused to each other to further anchor the stitching and prevent raveling thereof.

The lines of stitching **12** and **13** in diaper **10** may be of this chain stitch type and may be anchored by fusing, as illustrated in FIGURES 5 and 6, or may be anchored by the overedge stitching **14**, **15** without fusing. However, these lines of stitching **12**, **13** are usually of the lock stitch type and the overedge stitching **14**, **15** is sufficient to anchor the same against raveling, although such lock stitching may include a thermoplastic thread and be fused to prevent raveling in accordance with the present invention if desired. In this latter respect, there are many prefold diapers, such as the diaper shown in U.S. Patent No. 3,150,693, which are folded and stitched with lines of stitching similar to the lines of stitching **12**, **13** without any overedge stitching. In such cases, the lines of stitching securing the diapers in folded condition should include a thermoplastic thread fused in accordance with the present invention.

Further, while the present invention has been described in connection with and has particular utility with prefold diapers due to the frequent and repeated laundering to which diapers are subjected, it should be understood that the present invention is not limited thereto but has application to a wide variety of garments and other sewn articles.

It is, therefore, believed apparent that a novel nonraveling stitching for sewn articles is provided by the

present invention wherein the stitching is anchored against raveling by a thread thereof being fused to the article at selected areas thereof and preferably additionally fused to interlocking portions of itself or other cooperating sewing threads.

In the drawings and specification there have been set forth preferred embodiments of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. A prefold diaper formed of woven fabric cut and folded into a size and shape adapted to fit an infant and having lines of overedge stitching extending along and over the cut edges of the folded fabric to finish these edges and impart anti-ravel characteristics thereto, each of said lines of stitching comprising a thread consisting essentially of thermoplastic material and at least one additional thread of non-thermoplastic material interlocking with said thermoplastic thread, said thermoplastic thread having portions extending along one face of the fabric generally perpendicular to the edge of the fabric, and said portions being fused to the fabric and also to the interlocking portions of the non-thermoplastic thread only at the corners of the diaper to anchor the stitching and prevent raveling thereof during normal use of the diaper without undue stiffening of the edges of the diaper.

2. A prefold diaper according to claim 1 wherein there are two non-thermoplastic threads in each line of stitching and said thermoplastic thread is a looper thread.

3. A prefold diaper formed of woven fabric cut and folded into a seize and shape adapted to fit an infant and having lines of overedge stitching extending along and over the cut edges of the folded fabric to finish these edges and impart anti-ravel characteristics thereto, each of said lines of stitching comprising a needle thread penetrating through said fabric in spaced relation to the edge thereof and a pair of looper threads which interlock with each other at the edge of the fabric and also interlock with said needle thread on opposite sides of the fabric, one of said looper threads and said needle thread being formed of non-thermoplastic material, and the other looper thread consisting essentially of thermoplastic material and being fused to the fabric and also to the interlocking portions of said non-thermoplastic needle and looper threads to anchor the stitching and prevent raveling thereof during normal use of the diaper.

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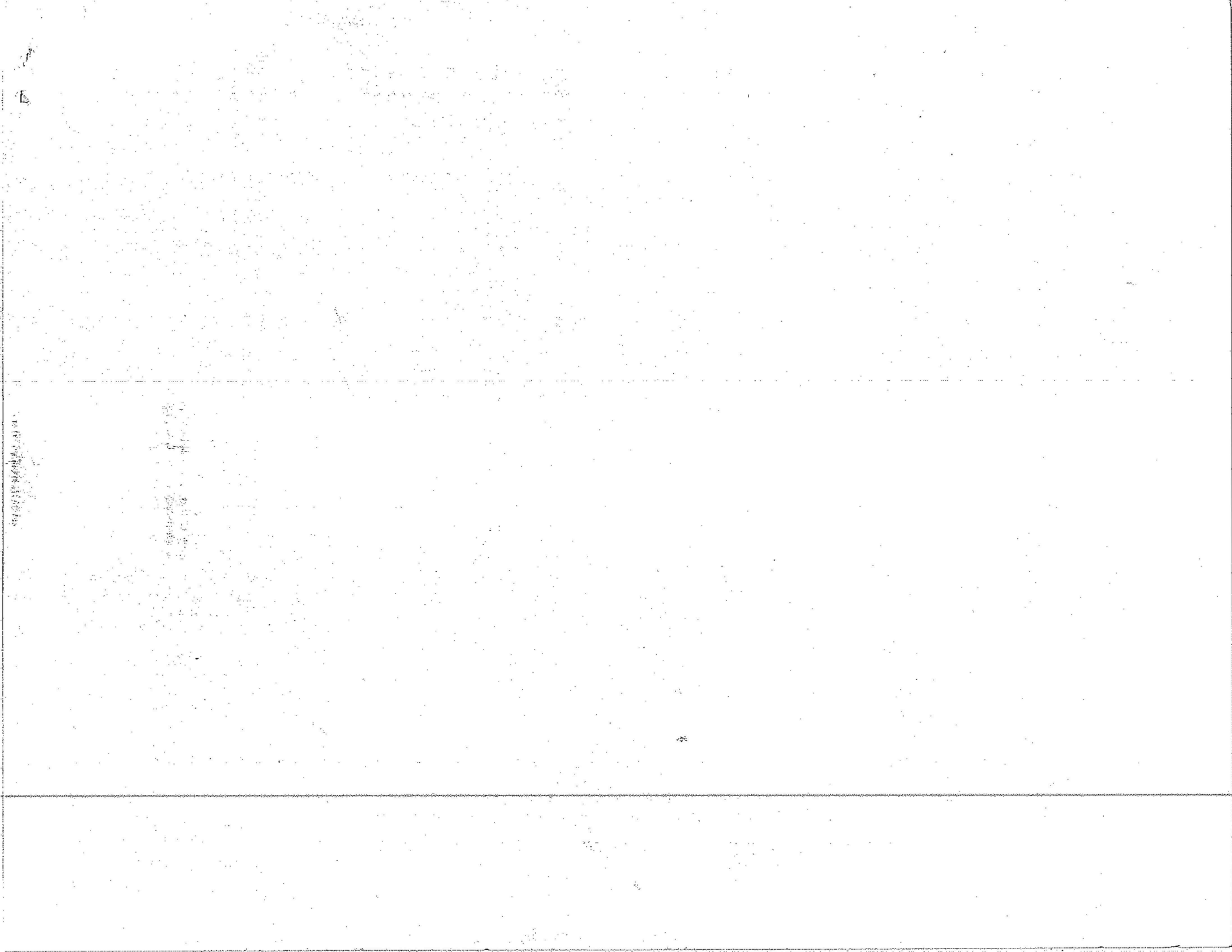
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CHARLES F. ROSENBAUM, *Primary Examiner.*

U.S. Cl. X.R.

28—77; 112—262, 441; 156—93; 161—50



N° 21,028 A.D. 1908

Date of Application, 6th Oct., 1908

Complete Specification Left, 6th May, 1909—Accepted, 8th Nov., 1909

PROVISIONAL SPECIFICATION.

Improvements in or connected with "Cash Registers."

I, GEORGE MACBETH, of 4, Streatham Avenue, Sefton Park, Liverpool, in the County of Lancaster, Engineer, do hereby declare the nature of this invention to be as follows:—

This invention has reference to cash registers, that is to say, apparatus used in connection with selling of goods, and cash received for same, and which indicates to the purchaser the sum paid to and received by the seller; and it relates especially to that type of such cash registers or apparatus, in which a till drawer or the like is employed, for the purpose of paying into it the moneys received, and paying out of change, and in which the actuation of the machine or apparatus is effected by levers or hand actuated parts, which are adapted to slide or move longitudinally, and also up and down, and the amount recorded on the recording strip or device, and indicated depends upon the position to which said parts are moved or slid, and for convenience, the invention will be described in connection with an apparatus having these characteristics.

In the following description of a cash register the improvements hereunder are comprised.

In connection with apparatus of the character above referred to, there is employed a mechanism or apparatus by which an indicating counter for showing the total sum received, or which represents total value of goods sold or supplied is actuated so as to add and indicate such sum, and this sum may be indicated in say, pounds, shillings and pence, or in any denomination of money that may be required.

The actuation of this integrator is effected and controlled partly by the movement of the till drawer, and partly by the actuation and position of the levers or parts by which the registering or recording mechanism is operated.

In connection with the said levers or actuating parts moved thereby, there is a controlling or regulating device or part which, according to the position to which it is moved, allows of the movement of another part—actuated by a spring or the like—and it actuates through toothed gear, such as a circular rack or the like, the integrator; hence, when the sum paid and recorded is a high one, the movement of the integrator actuating parts is relatively large, and *vice versa*, and so the movement in the counter itself is correspondingly large.

This movement takes place when the drawer is operated, through spindle or the like, actuated by the drawer, having an incline or cam or the like, which operates in connection with a roller and rod, whereby the said parts are allowed to move, or are moved when the drawer is opened or closed.

In the case where the total is to be represented in pounds, shillings, and pence, there may be duplicate sets of mechanisms, one lever or the like in connection with the pence actuating and registering mechanism, and another lever or levers or the like in connection with the shillings and pounds, actuating and registering mechanism; furthermore, in such a case, one of said mechanisms would be actuated by the drawer when moving out, and the other when it is returned, through means such as specified; and the part moved or actuated by the drawer



(which may be moved in one direction by a spring) has a pawl detent device connected with it by which the actuation cannot be completed until the drawer is fully moved in closing same.

As an illustration of the operation of these mechanisms and integrator, the pence mechanism may register on the outward movement of the drawer, whilst when the drawer returns, and the parts are actuated in the opposite direction, they do not actuate the integrator, and this is obtained by the use of a free wheel, or free movement mechanism. On the other hand, the pounds and shilling mechanism is not operated on the opening of the drawer through the employment of a similar free wheel, or free movement mechanism, and it registers upon the closing of the drawer. Thus the two mechanisms never operate upon the integrator at the same time, and thus there can never be conflict between them, and the shillings portion of the integrator is simply actuated from the pence portion when the latter has totalled up twelve pence.

If the integrator be of the wheel type, with numeral wheels mounted on a common axis, there will be twenty divisions, say in the shillings wheel, and the pounds wheels are actuated therefrom when the latter has made a complete revolution. Otherwise than when the pence ring or wheel is actuating the shillings ring or wheel—that is, advancing it one shilling—the rings or wheels are free to rotate independently.

With regard to the movement limiting device, moving with or moved by the said hand actuated part, these may conveniently consist of plates with one edge in the form of steps with which the said integrator or adding device operates when the parts are moved; these steps being disposed on an incline, and so as to govern and limit the amount of movement according to the position to which the hand actuated part has been moved, which depends upon, and is according to the amount of money received.

When the said adder or integrating device is actuated, and the drawer pulled out, shutters are moved from windows through which the sum received and to be recorded is exposed; and then when the drawer is closed, the windows are closed by the shutters. In connection with the shutter mechanism, there is a spring or the like which holds the shutters open until the actuating lever handle or the like is moved in the vertical plane, before shifting it longitudinally.

In cash registers of the kind referred to, there are employed in some cases, racks which operate the registering type setting device through spur wheels; and in connection with these parts, the hand actuating and movement limiting devices may be connected. In some cases, however, the movement limiting and regulating device may be mounted on the rack driven wheels or pinions; or, may be provided on any other suitable part which is actuated when the apparatus is actuated.

In some cases, one of the hand actuated parts may be adapted to be moved automatically to zero when the other is moved by means of a spring or weight. Namely, when one handle or actuating part is raised at the commencement of movement of the apparatus out of the notched bar or the like, which it works in connection with, it lifts the other out, or disengages it, by being connected with it, and the spring or weight then at once moves the other handle or lever or mechanism to zero from the last position of registration. This spring or weight may act on the part by a wire, chain, or flexible band attached to the travelling rack, or a coiled or other spring mounted on the rack operated pinions or wheels above referred to, or equivalently operated.

Dated this 5th day of October, 1908.

E. R. ROYSTON & Co.,
Applicant's Patent Agents,
15, Water Street, Liverpool, and
265, Strand, London.



COMPLETE SPECIFICATION.

Improvements in or connected with "Cash Registers."

I, GEORGE MACBETH, of 4, Streatham Avenue, Sefton Park, Liverpool, in the County of Lancaster, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention has reference to cash registers, that is to say, apparatus used in connection with selling of goods, and cash received for same, and which indicates to the purchaser the sum paid to and received by the seller; and has reference more particularly to mechanism for adding or totalising the various sums paid into and indicated or recorded by the register of the kind in which the mechanism is adapted to be operated through the movement of the drawer or till, or the levers whereby the mechanism is operated, or both, and in which means are provided for operating the shillings and pence counters separately or collectively. The invention relates especially to that type of cash registers or apparatus, in which a till drawer or the like is employed, for the purpose of paying into it the moneys received, and the paying out of change, and in which the actuation of the machine or apparatus is effected by levers or hand actuated parts, which are capable of being moved longitudinally and also up and down, and the amount recorded on the recording strip or device, and indicated, depends upon the position to which said parts are moved or slid; and for convenience, the invention will be described in connection with an apparatus having these characteristics, and which have been set forth in a previous Patent granted to me, No. 19,034, of 1907.

The invention will be described in connection with the accompanying drawings, and in which

Figure 1 is a front elevation,

Figure 2 a side elevation, and

Figure 3 a plan.

In connection with apparatus of the character above referred to, there is employed a mechanism or apparatus by which an indicating counter for showing the total of the sum received, or which represents the total value of goods sold or supplied, is actuated so as to add and indicate such sum; and this sum may be indicated in say, pounds, shillings, and pence, or in any denomination of money that may be required.

In the arrangement shown in the drawing, 1 generally indicates the integrator, and in the case shown, consists of a plurality of numeral discs, 2, the numerals on which may represent pounds, a single disc 3, representing shillings, and a disc 4, representing pence and half-pence. The shillings disc 3, is operated from a toothed wheel 5, which is mounted on its spindle loosely, and is provided with teeth which project on one side in the form of ratchet teeth, and operate in conjunction with a spring pawl carried from a disc 6, which is fixed on the spindle of the counter, and adapted to actuate the shillings disc 3, when this spindle is revolved. The toothed wheel 5 gears with a toothed quadrant 7, and is adapted to be rotated thereby for operating the disc 6 in the known manner, that is, when the wheel 5 is revolved in one direction it will impart motion to the disc 6, but when revolved in the other direction no movement is imparted to the disc.

The pence and half-pence disc 4 is similarly operated to the disc 3, through the toothed wheel 8, the pawl disc 9 fixed on the spindle of the disc 4; and a



toothed quadrant 10 operating wheel 8; and this pence and half-pence disc 4 is adapted to operate the shillings disc 3, when it has received a complete revolution, by the pin 11 in it, which engages with and moves once in the revolution, the pinion 12. The partial revolution of this pinion drives another pinion 13 fixed on the same spindle, which meshes with and drives the toothed pinion 14, which drives the disc 3 and moves it a distance equal to the distance apart of the numerals—1 to 20—thereon, each time the pin 11 actuates the wheel 12.

With regard to the action of this mechanism, and its control, the drawer 20, when pressed in, moves the quadrant racks 7 and 10 in opposite directions. Namely the quadrant 7 moves the toothed ratchet wheel 5 in the direction in which this ratchet wheel will revolve the shillings disc 3, while the movement of the rack 10 revolves the ratchet toothed wheel 8, in the direction in which it slips past the disc 9, and does not revolve the pence disc 4. And this pence disc 4 is revolved, when the rack 10 is revolved in the opposite direction upon the drawer being opened. The actuation of these racks 7 and 10 by the drawer, in the manner referred to, is effected by a bar 21 mounted in a frame 22, having at its end an incline 23, which operates upon a roller 24 on the lower end of the sliding bar 25, which at its upper end is provided with a cross head 26, which comes under two blocks 27, connected with the quadrants 7 and 10 by connecting rods 28.

When the drawer is out, a spring 30 presses the bar 21 out, and so the roller 24 runs down the incline 23; and in this action, it is the pence disc 4 that is rotated, while when the drawer is again pressed in, the roller 24 will be pushed up by the incline 23, and in this action it is the shillings disc 3 that is actuated; so that the actuation of this disc 3 by the shillings side of the apparatus takes place at a different time to that when it—the shillings disc—is rotated, from the pence disc 4, when this has made a complete rotation.

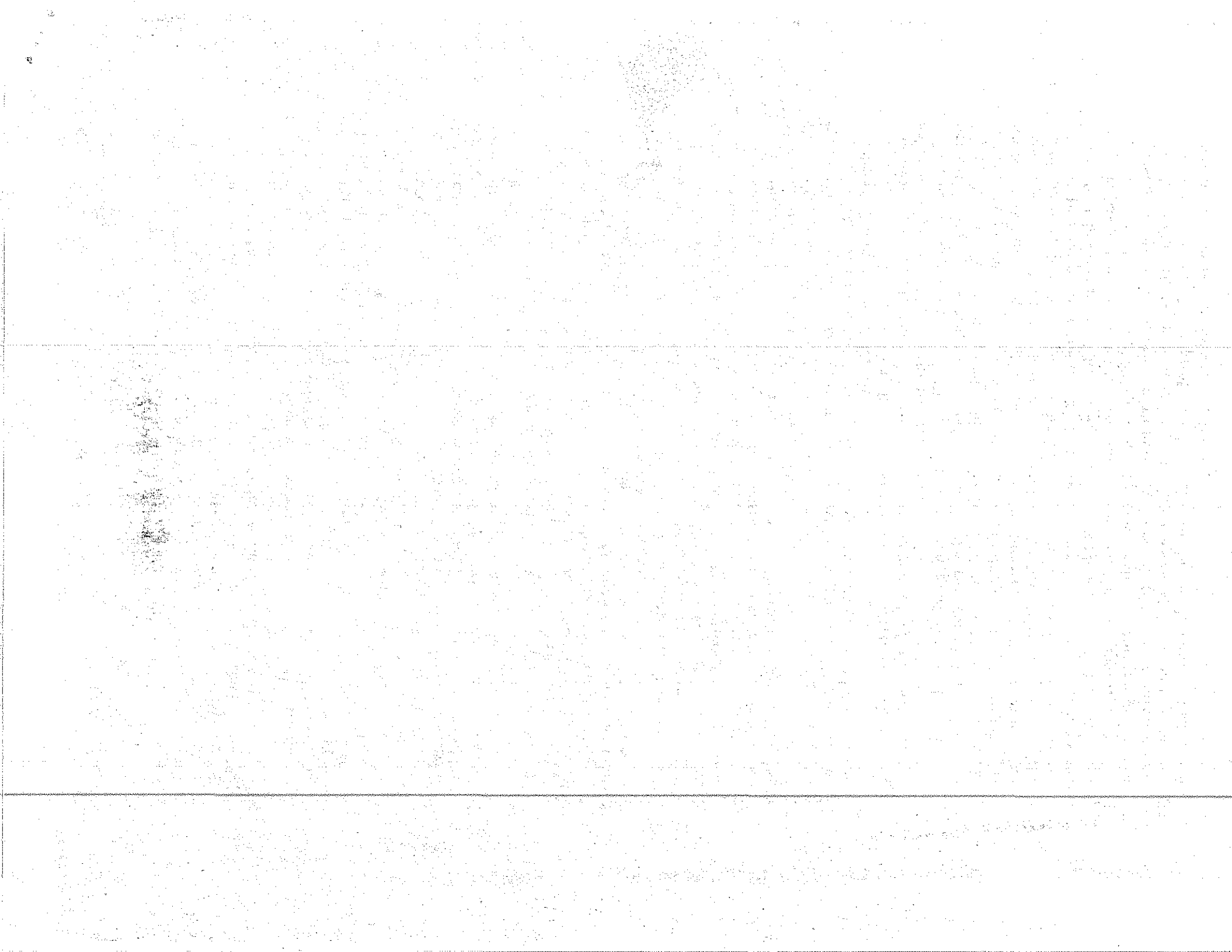
Of course, the pounds discs 2 are rotated from the shillings disc 3 in the usual way, the discs being operated from one another as in ordinary counters.

To give the right amount of movement to the discs 3 and 4, so as to correspond with the amount to which the apparatus has been set or actuated by the pence and shillings hand actuated levers and sliding mechanism, they are controlled and regulated by two regulating devices consisting of two bars 31 with their upper edges in the form of stepped stops, on which dependent bars 32 on the blocks 27 rest in their normal position. Thus if the bars 31 be slid in one direction or the other, in the manner described, by the hand actuating levers, (in connection with which they operate), according to the position they are moved to, so will the stroke of the bars 32, (and hence the amount of rotation of the quadrants 7 and 10) be determined.

The bars 32, as will be seen, have a positive upward movement; while their downward movement, and also the downward movement of the bar 25, are effected by springs 33 fitting round the pins 34.

In connection with the bar 21, there is a hinged pawl detent 36, which is normally held by a spring 37, so as to stand in the vertical position shown in Figure 2, and this pawl operates in connection with a bar 38 on 21, so as to prevent the drawer being moved in the opposite direction to that in which it is started, until the complete actuation, that is, the pressing in or moving out, has been effected. When, in starting movement of the bar 21 by the drawer, the tip of the pawl 36 is on the top of the bar 38, it will be plain it will be inclined, and will thereby prevent the bar 21 from being moved in the opposite direction to which it has commenced to move, unless a complete stroke is formed, when the pawl passes the bar 38 and lies over one or other end in the opposite shown.

It will be understood that it is not broadly new to propose the employment of stepped members in connection with cash registers, as it has been already proposed to employ these in connection with hand operated keys, but under the present application the stepped members are employed differently and for a different purpose as hereinbefore set forth.



Macbeth's Improvements in or connected with "Cash Registers."

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. In a cash register, a counter adapted to be controlled in its movement, or have its operation governed through the medium of a stepped or inclined member which is interposed between the manually operated part and the counter mechanism, and is adapted to be moved in the direction of its length by the manually operated part; substantially as set forth.

2. In a cash register, a counter adapted to be put in operation by the movement of the drawer or till part, and to be controlled in its movement in one direction by a graduated stepped member, which is adapted to operate in conjunction with the hand actuated part or parts of the indicating and recording mechanism, for controlling the movement of the counter mechanism; substantially as set forth.

3. In a cash register wherein a cash counter for indicating different denominations of money, such as pounds, shillings and pence, or pounds and pence, is employed, a counter actuating mechanism consisting of toothed gearings adapted to actuate the counter when moving in one direction, and not in the other, one set of gearing being adapted to operate the shillings, and the other the pence, both of said toothed gearings being operated from the movement of the drawer, and controlled by slides as 31, and part as 32 operating in connection with same; substantially as described.

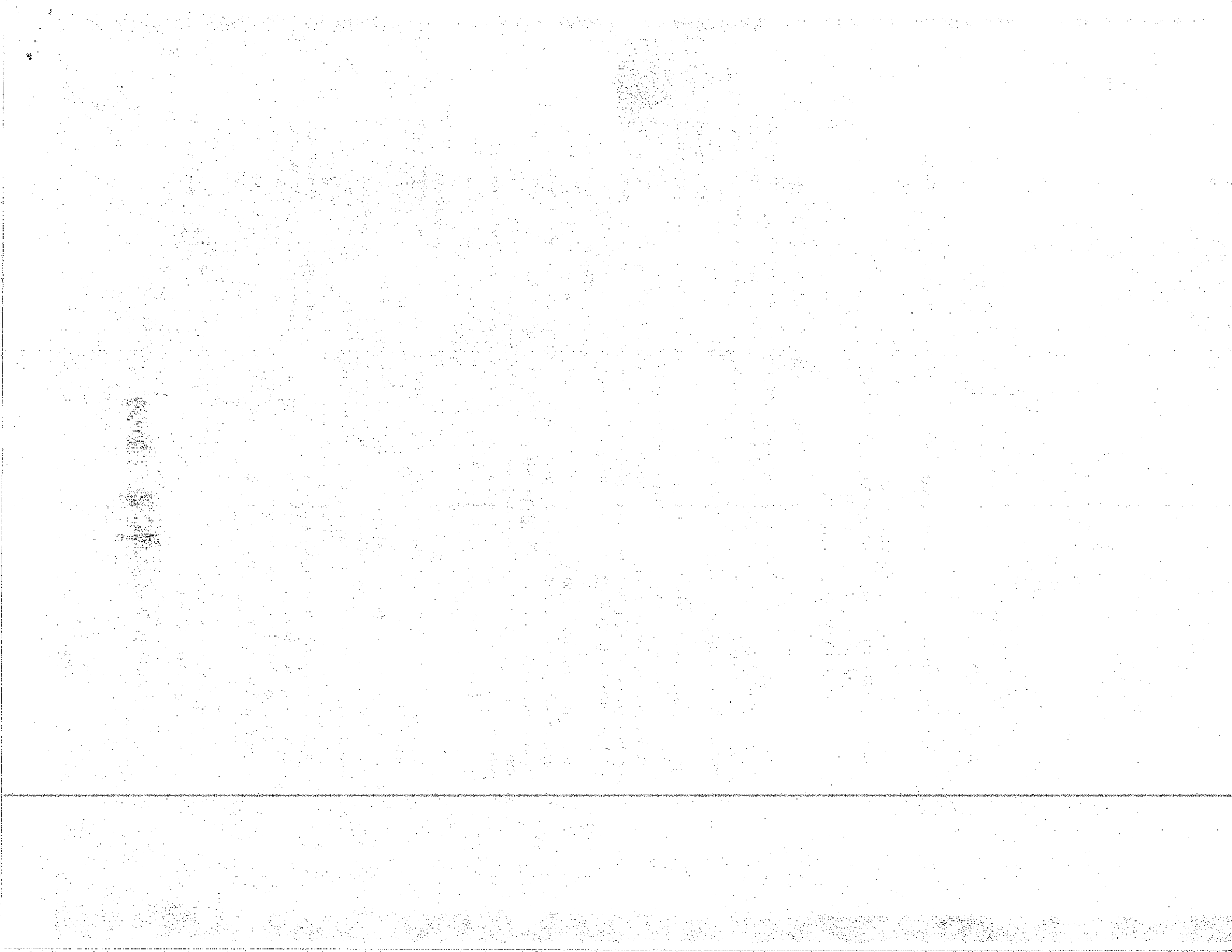
4. A cash register wherein the indicating and recording mechanism for each denomination of money is actuated by a single hand operated lever and the movement of each of the parts representing various denominations of the adding and totalising mechanism is adapted to be controlled through the medium of a graduated stepped member which is also actuated by the said lever; substantially as set forth.

5. In a cash register wherein a cash counter for indicating different denominations of money, such as pounds, shillings and pence, is employed, the counter actuating mechanism having parts arranged, combined and adapted to operate as set forth with reference to and shown in the drawings.

Dated this 5th day of May, 1909.

E. R. ROYSTON & Co.,
Applicant's Patent Agents,
Tower Building, Water Street, Liverpool, and
265, Strand, London.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1909.



[This Drawing is a reproduction of the Original on a reduced scale]

Fig. 3.

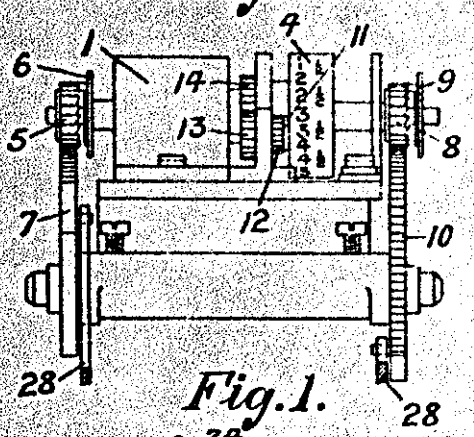


Fig. 2.

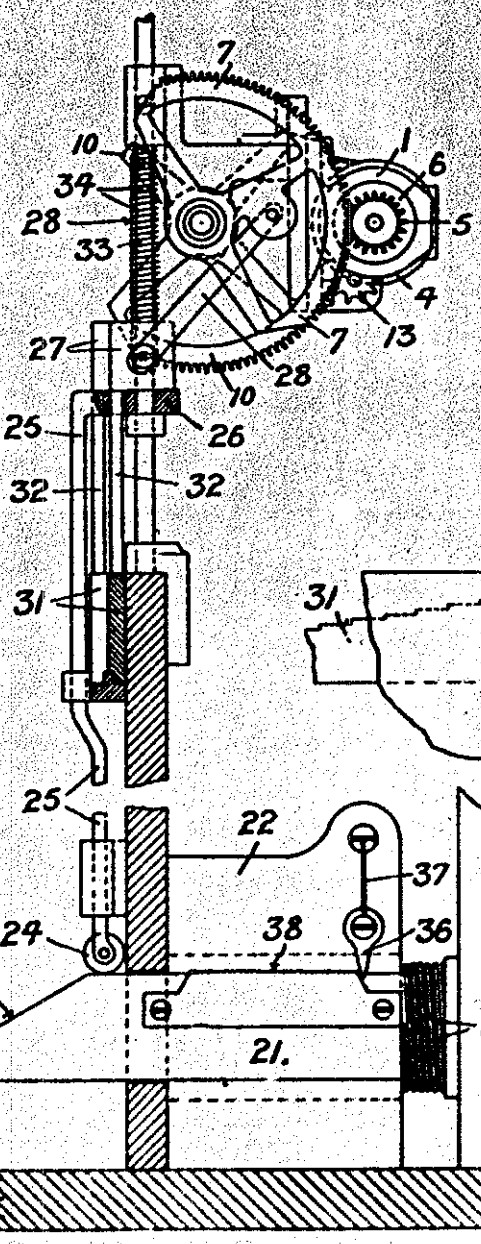
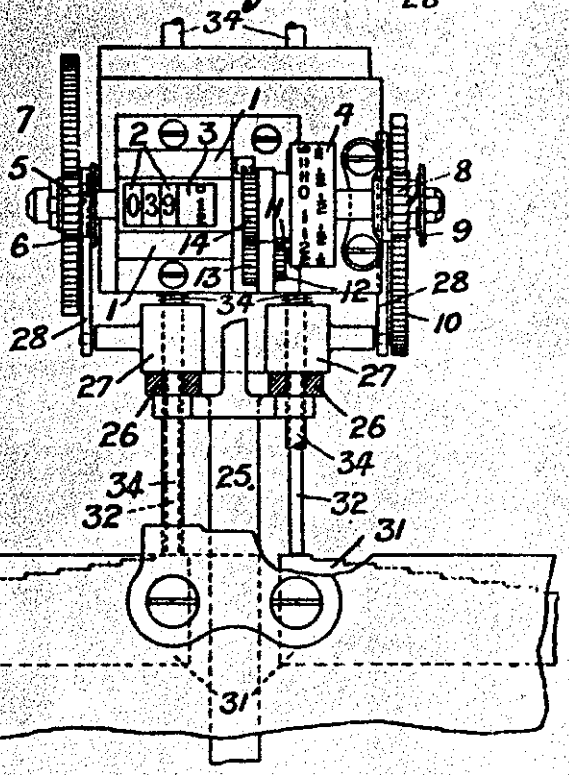
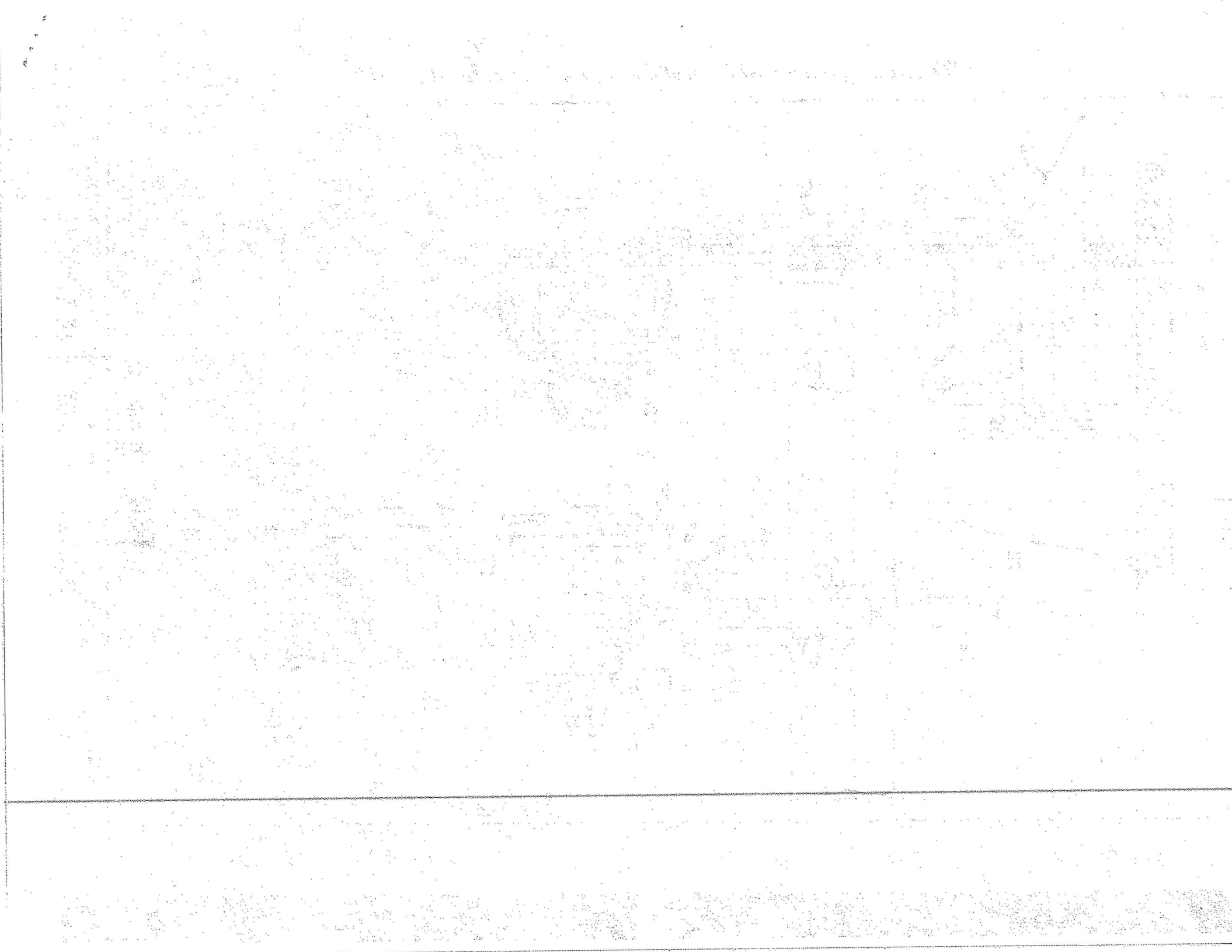


Fig. 1.





US005839998A

United States Patent [19]

Wilkinson

[11] **Patent Number: 5,839,998**

[45] **Date of Patent: Nov. 24, 1998**

[54] **COMBINATION SLANT BOARD AND ABDOMINAL ROCKER**

[76] Inventor: **William T. Wilkinson**, P.O. Box 73, Salem, N.J. 08079

[21] Appl. No.: **710,510**

[22] Filed: **Sep. 18, 1996**

[51] **Int. Cl.**[6] **A63B 23/02**

[52] **U.S. Cl.** **482/140**; 482/95; 482/123; 482/133; 482/142

[58] **Field of Search** 482/72, 92, 95, 482/96, 121, 122, 123, 129, 130, 131, 132, 133, 135–140, 142, 148, 908; 601/23, 24, 26, 33

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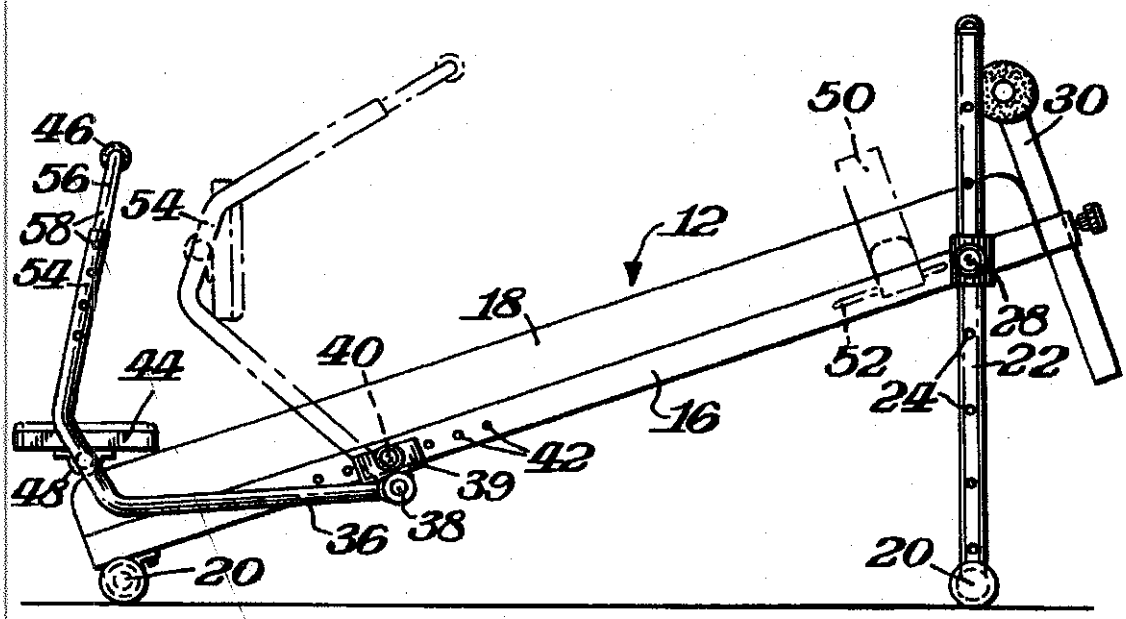
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Primary Examiner—Jeanne M. Clark
Attorney, Agent, or Firm—Connolly & Hutz

[57] **ABSTRACT**

A combination slant board and abdominal rocker includes a slant board which comprises a rigid body support elevated at one end to incline the body support. The abdominal rocker has a frame with a base section pivotally mounted adjacent to the body support and a grip section spaced from the base section. A neck rest is mounted to the frame between the base section and the grip section. The grip section and the neck rest are located above the body support.

29 Claims, 6 Drawing Sheets



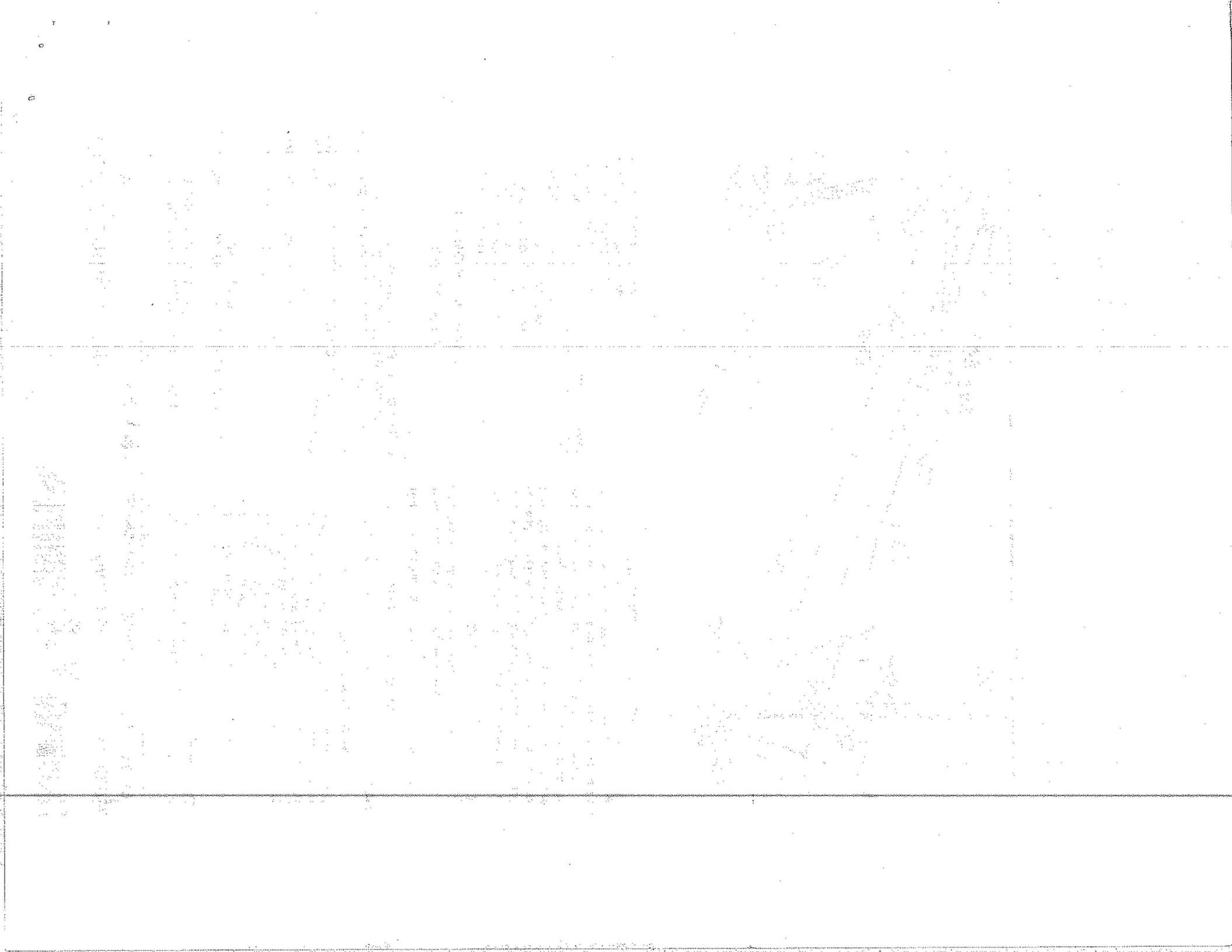


Fig.2.

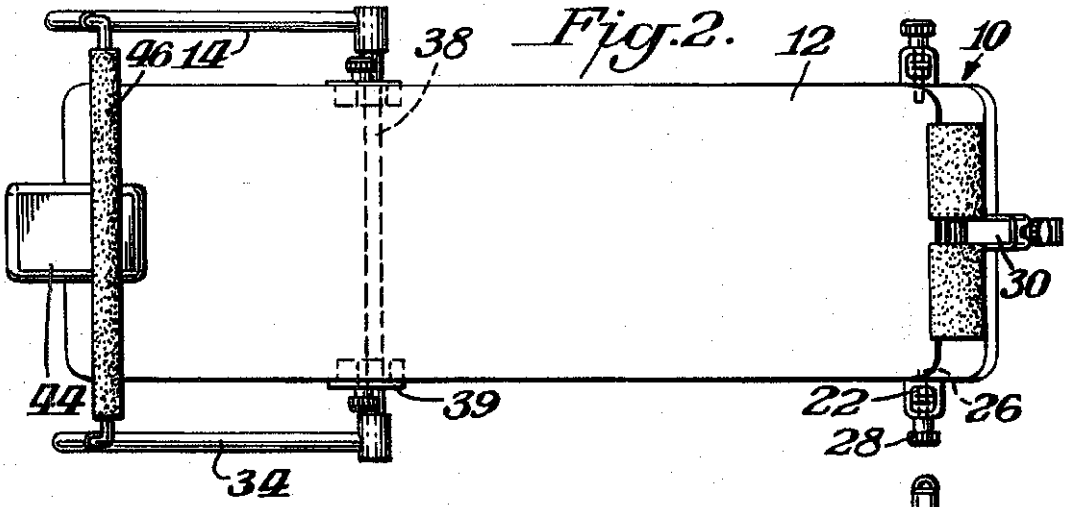


Fig.1.

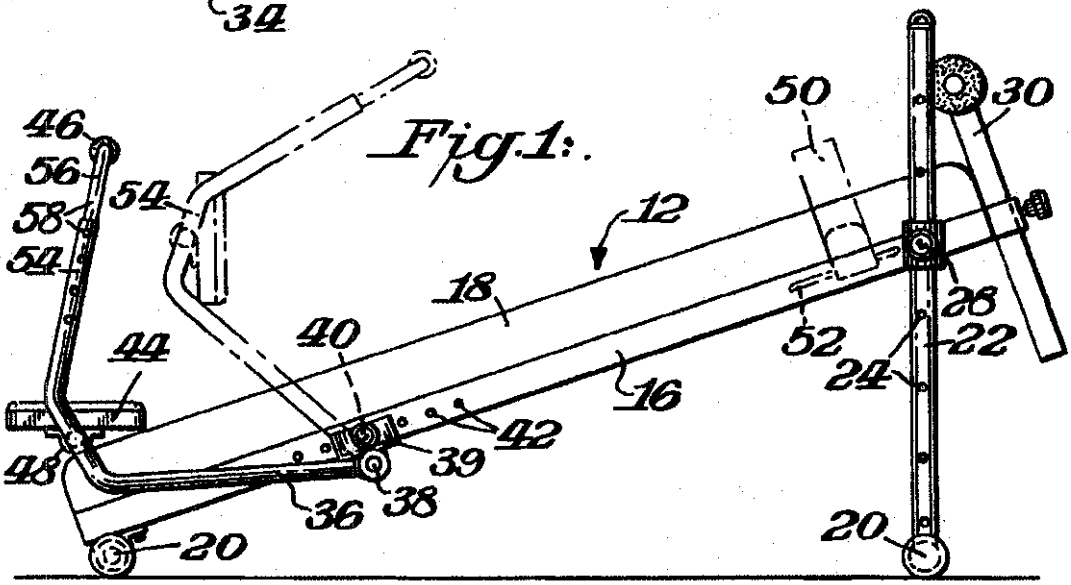


Fig.3.

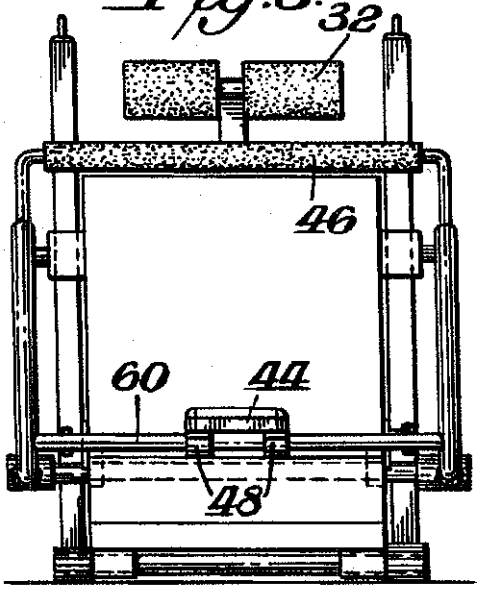


Fig.4.

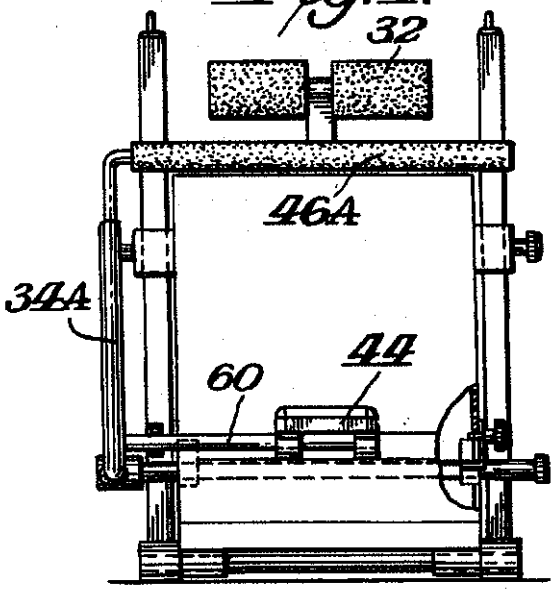


Fig. 5.

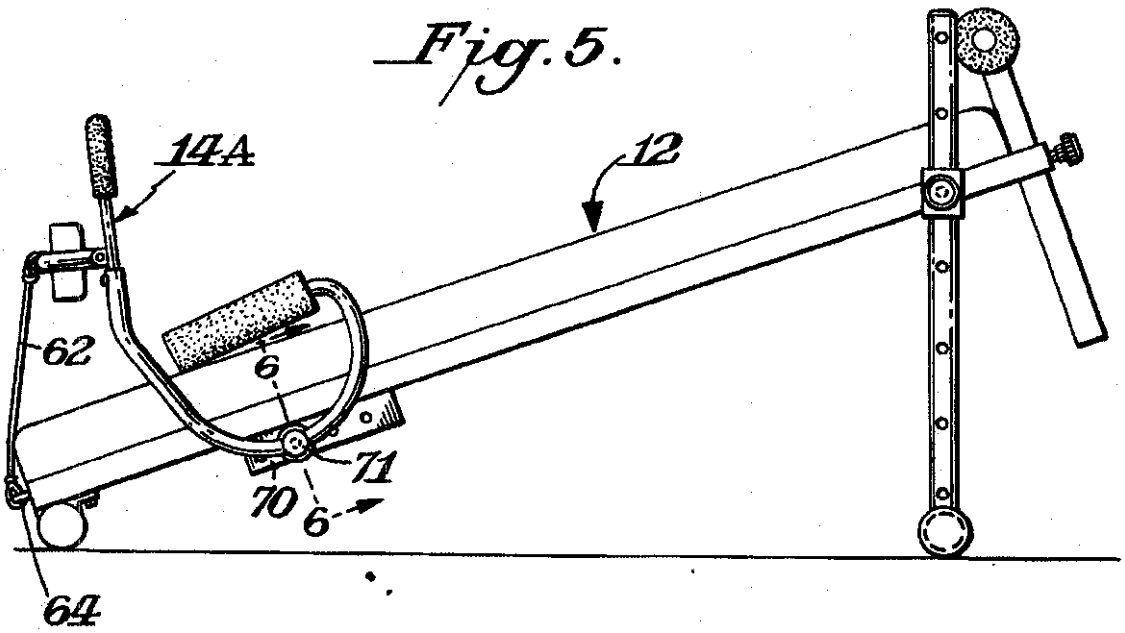


Fig. 6.

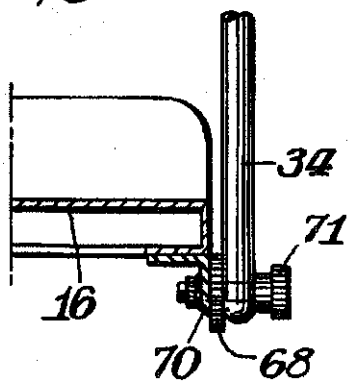


Fig. 16.

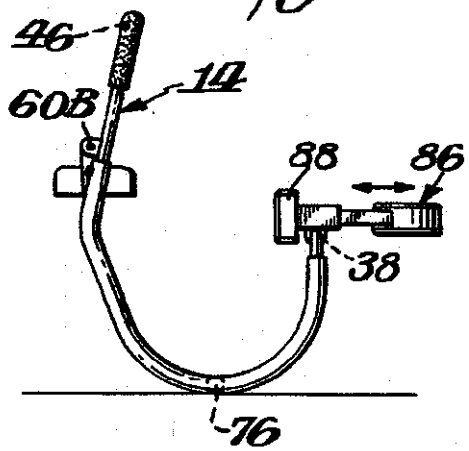


Fig. 15.

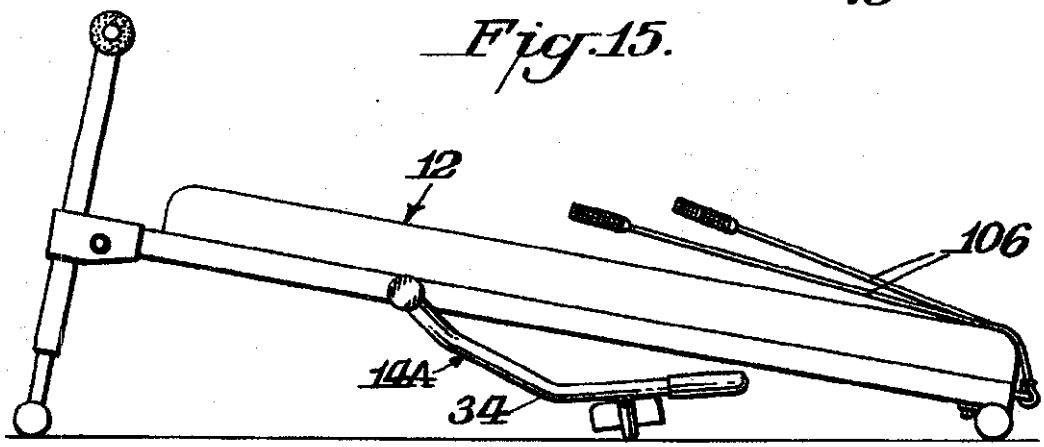




Fig. 7.

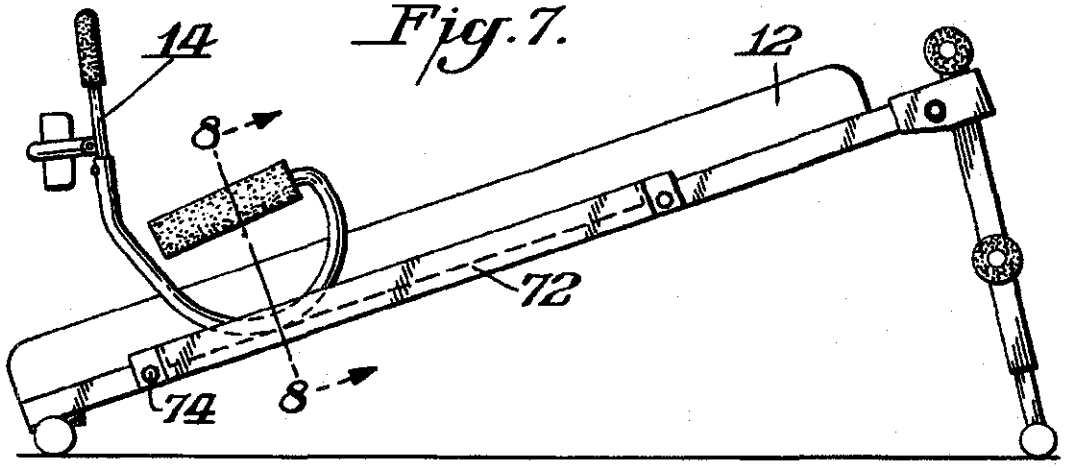


Fig. 8.

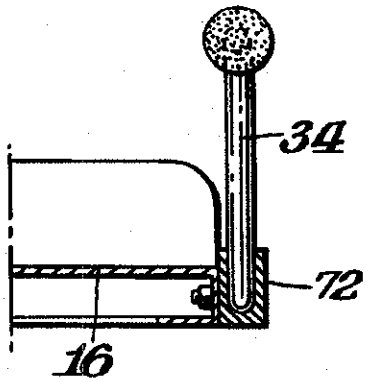


Fig. 10.

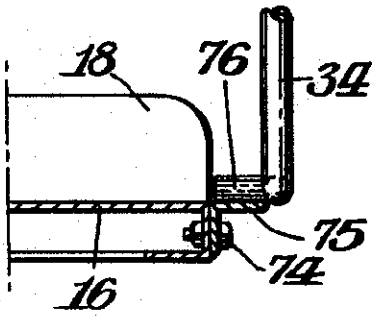
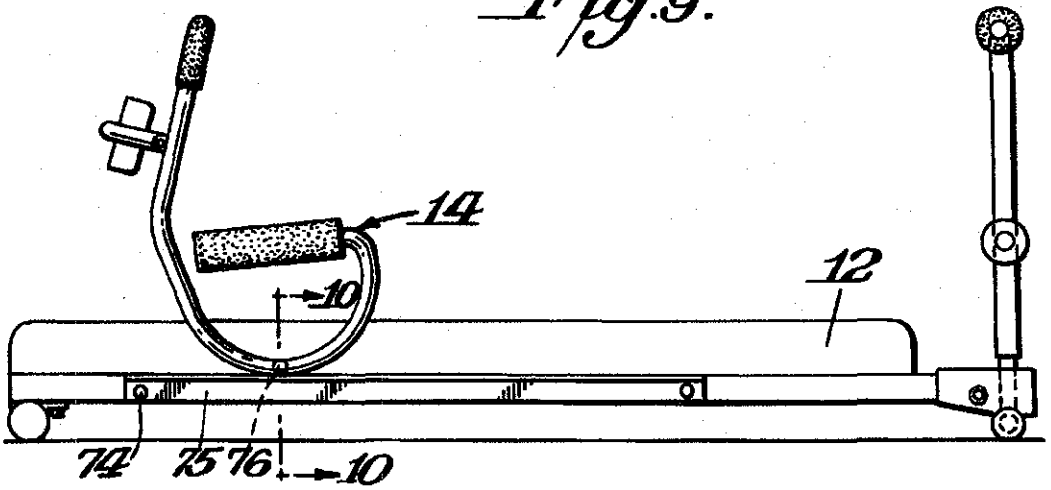


Fig. 9.



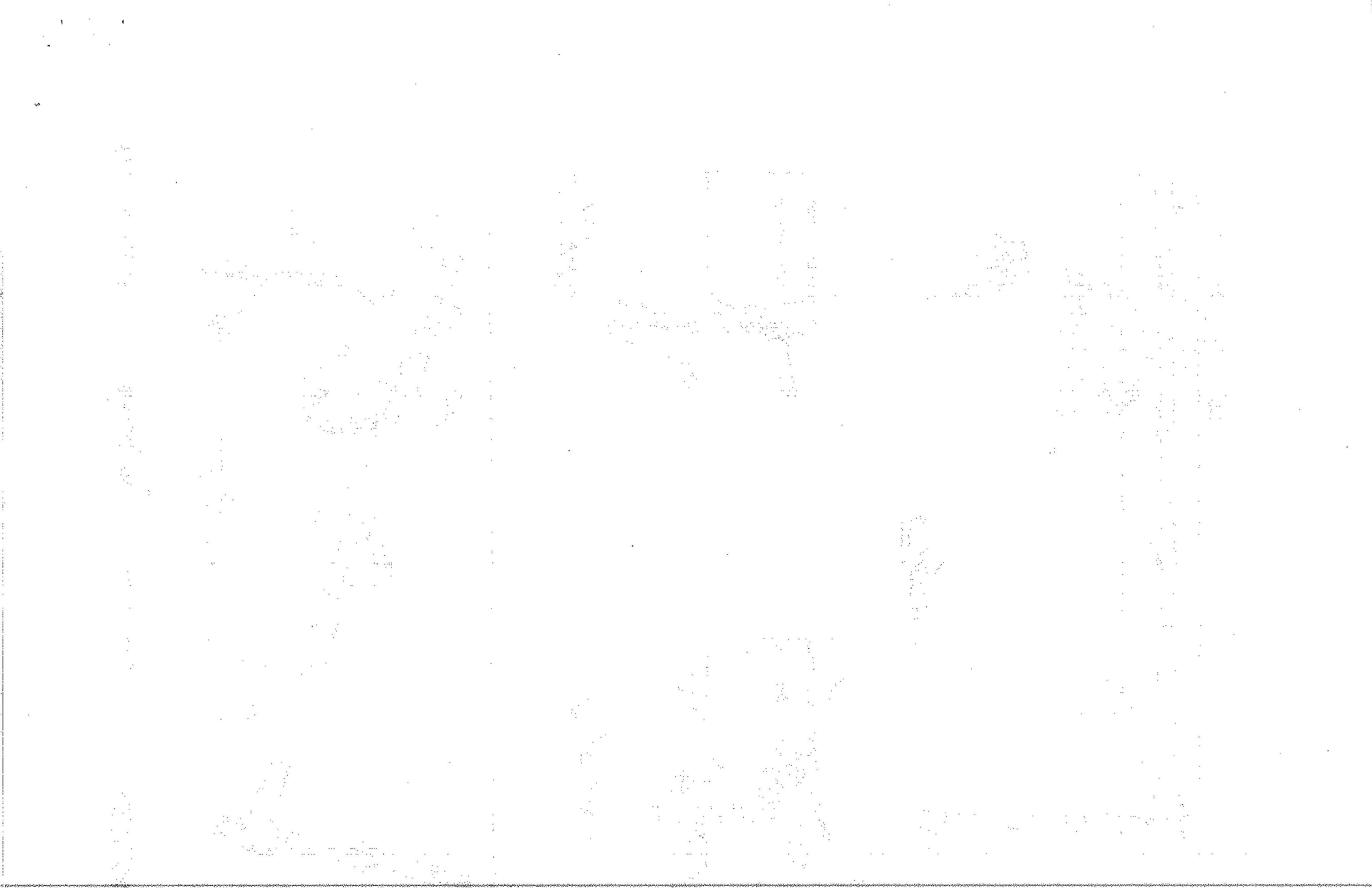
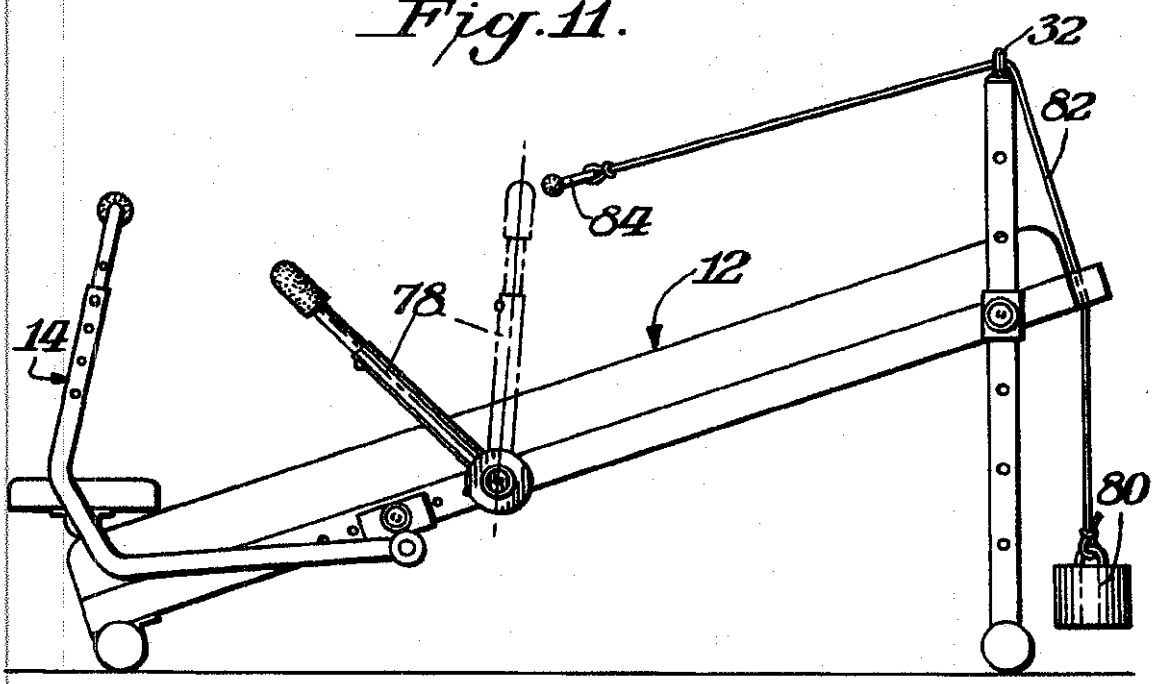


Fig. 11.



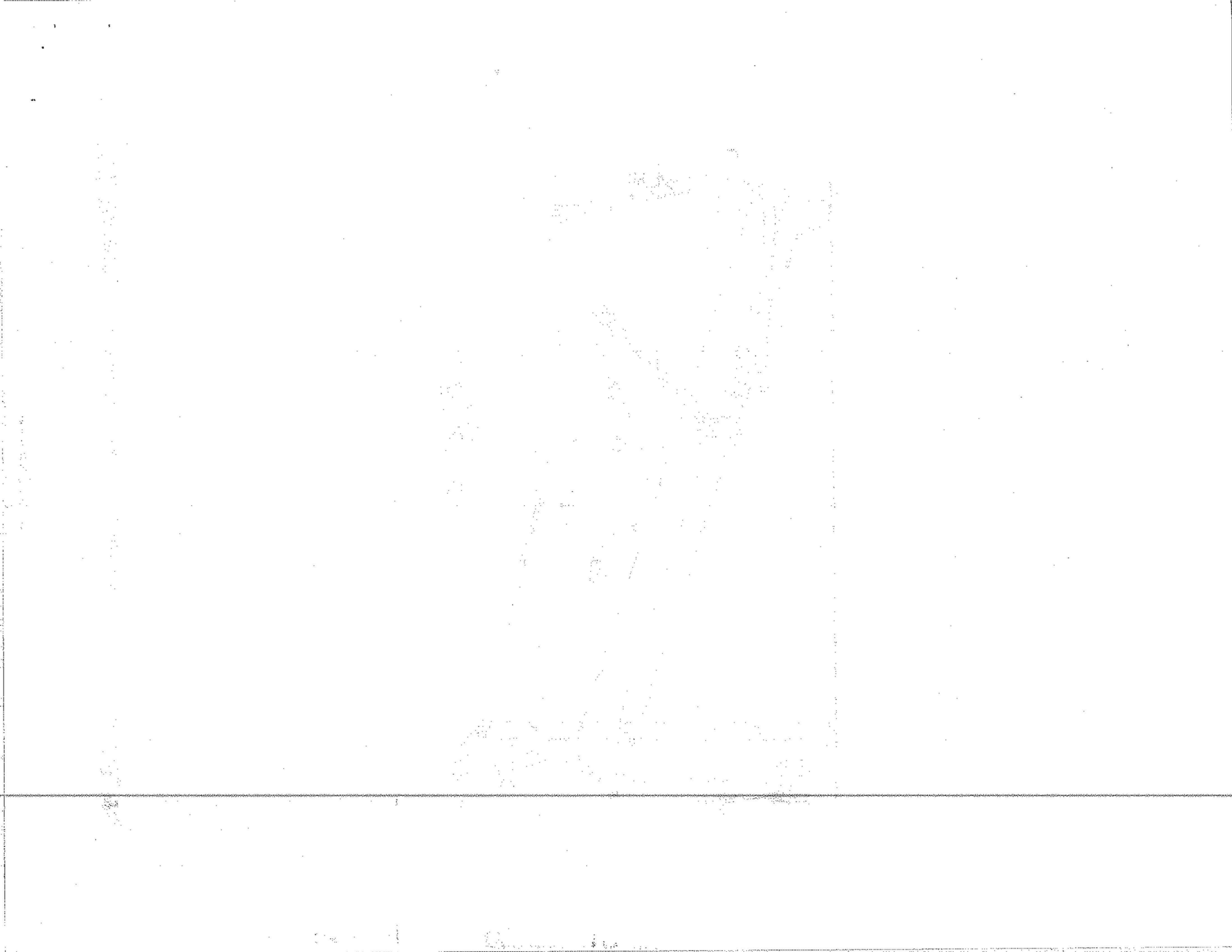


Fig. 13.

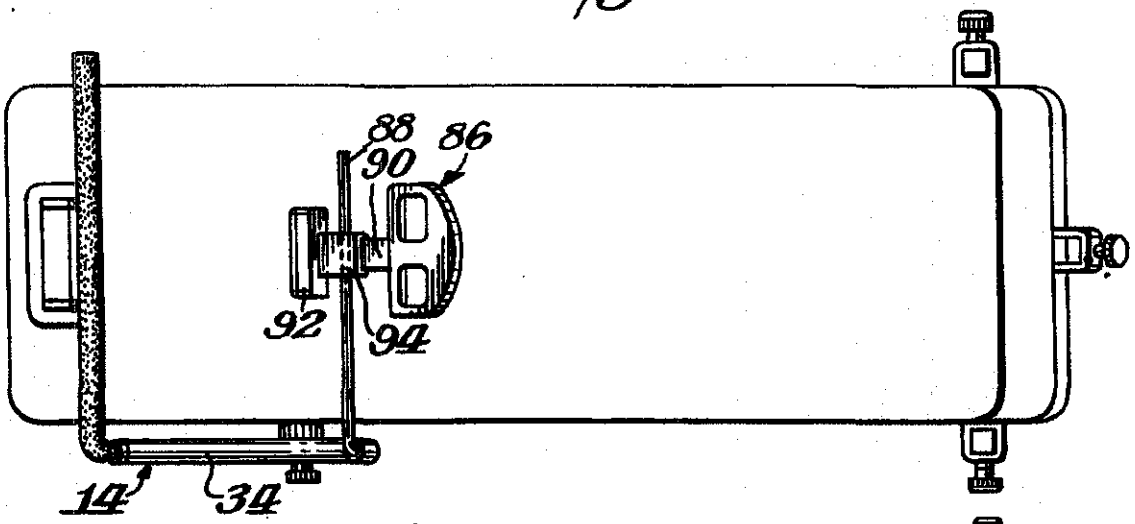


Fig. 12.

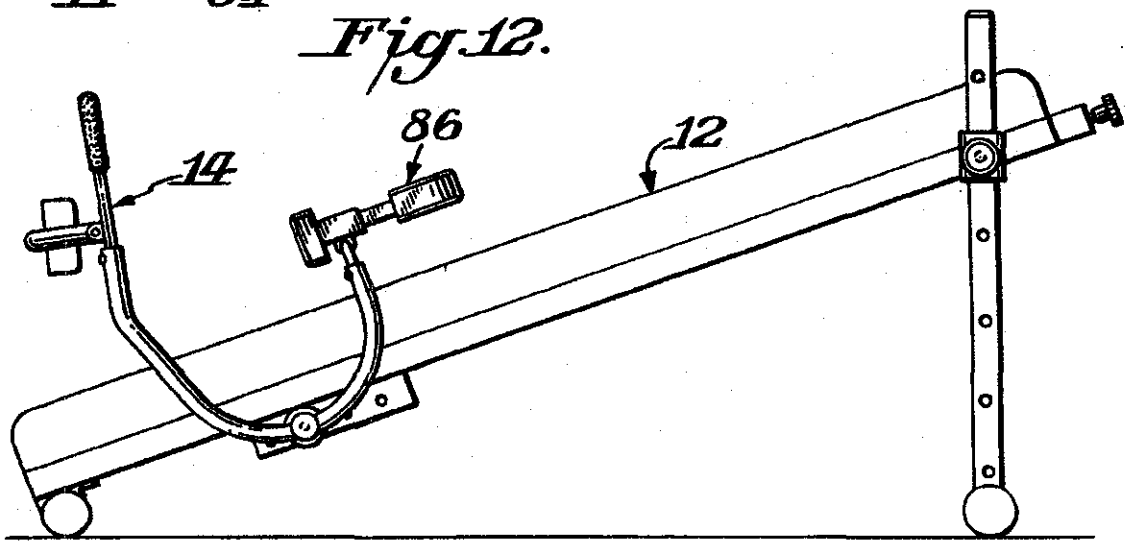




Fig. 14.

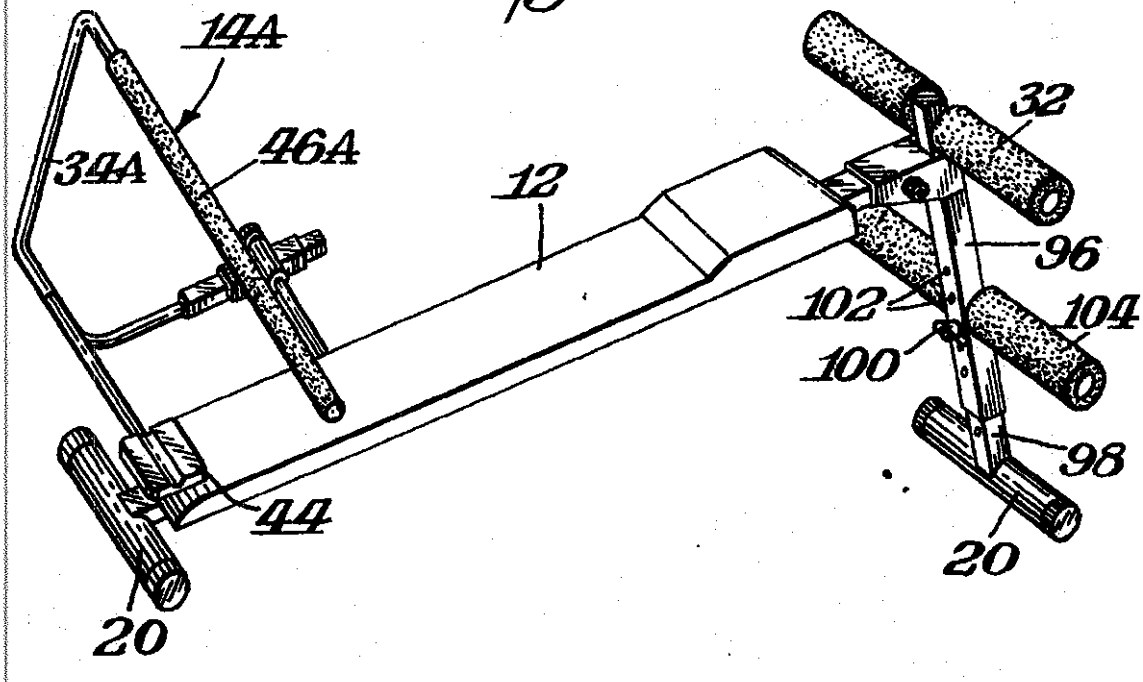
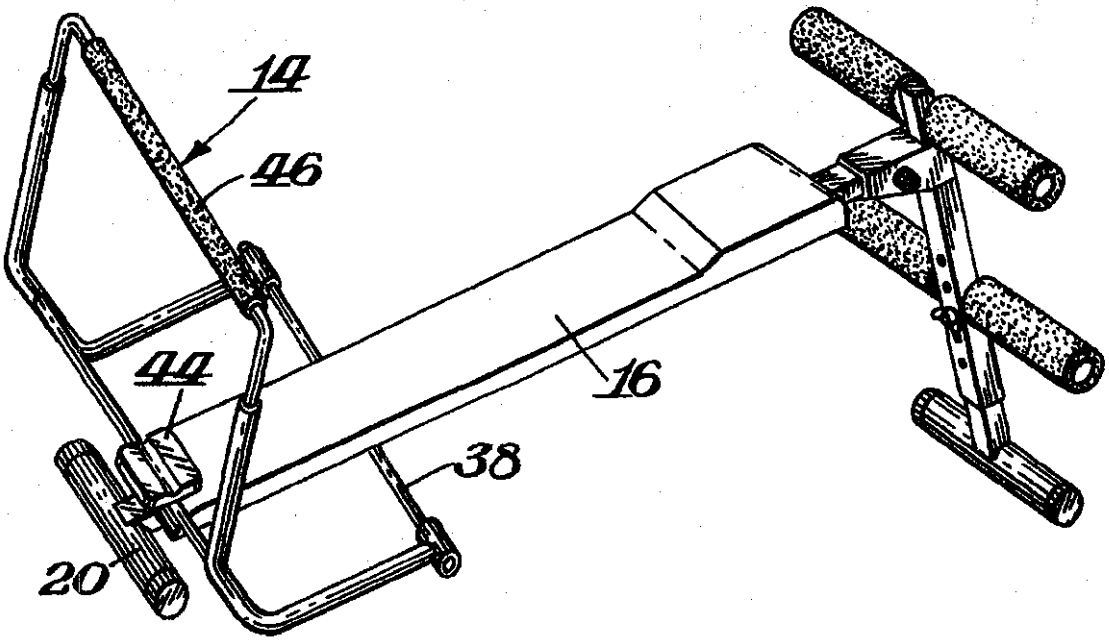


Fig. 17.





COMBINATION SLANT BOARD AND ABDOMINAL ROCKER

BACKGROUND OF THE INVENTION

Two major devices are available which develop abdominal muscles. One of the devices is a slant board or bench and the other is an abdominal rocker. Each of the devices has advantages and has drawbacks. The slant board has no neck support, provides no rocking action and has no arm or hand support and the exercise is not done on a horizontal surface. The rocker is done on a horizontal surface and has no angle adjustability to add resistance from gravity. The rocker also has no padding beneath the user, no place to anchor the feet and is prone to lateral or side to side instability.

SUMMARY OF THE INVENTION

An object of this invention is to provide a combination exercise device which combines the features of both the slant board and the abdominal rocker into a single device to incorporate the respective advantages while minimizing the problems attendant with each.

A further object of this invention is to provide such a combination exercise device which permits each of the components to be used individually when desired.

In accordance with this invention a combination exercise device includes a slant board and an abdominal rocker. The slant board comprises a rigid body support which is preferably padded and is elevated at one end to incline the body support. The abdominal rocker includes a frame having a base section pivotally mounted adjacent to the body support with a grip section spaced from the base section. A neck rest is mounted to the frame between the base section and the grip section with the grip section and neck rest being located above the body support so that the user can lay on the body support with the neck or head on the rest and the hands or arms at the grip section.

In a preferred practice of this invention the abdominal rocker is mounted to the slant board in one of a number of selected different positions. Preferably, the mounting is in a detachable manner so that the slant board and abdominal rocker could be used independently of each other when desired.

In other practices of this invention various other types of exercise components may be included in the combination. Such components could include, for example, rowing arms, elastic cords and weights. An abdominal flex device might also be included on the abdominal rocker. The abdominal rocker might be adjustable in width to accommodate different size slant boards.

THE DRAWINGS

FIG. **1** is a side elevational view of a combination exercise device in accordance with this invention;

FIG. **2** is a top plan view of the device shown in FIG. **1**;

FIG. **3** is a left end elevational view of the device shown in FIGS. **1–2**;

FIG. **4** is a left end elevational view similar to FIG. **3** of a modified form of device;

FIG. **5** is a side elevational view of yet another form of combination exercise device in accordance with this invention;

FIG. **6** is a cross-sectional view taken through FIG. **5** along the line **6—6**;

FIG. **7** is a side elevational view of still yet another form of combination exercise device in accordance with this invention;

FIG. **8** is a cross-sectional view taken through FIG. **7** along the line **8—8**;

FIG. **9** is a side elevational view of still yet another form of combination exercise device in accordance with this invention;

FIG. **10** is a cross-sectional view taken through FIG. **9** along the line **10—10**;

FIG. **11** is a side elevational view of still yet another form of combination exercise device in accordance with this invention;

FIG. **12** is a side elevational view of a further form of combination exercise device in accordance with this invention;

FIG. **13** is a top plan view of the device shown in FIG. **12**;

FIG. **14** is a perspective view of yet another combination exercise device in accordance with this invention;

FIG. **15** is a side elevational view of a further combination exercise device in accordance with this invention;

FIG. **16** is a perspective view of an abdominal rocker that may be used with various forms of slant boards in accordance with this invention; and

FIG. **17** is a perspective view of yet another form of combination exercise device in accordance with this invention.

DETAILED DESCRIPTION

FIGS. **1–3** show a combination exercise device **10** in accordance with this invention. In general, exercise device **10** includes a slant board or bench **12** and an abdominal rocker **14**. The invention may be broadly practiced with various forms of slant boards and various forms of abdominal rockers. In this respect, the invention in its broad form is based upon the combination of the two exercise units into a single exercise device.

In the embodiment shown in FIGS. **1–3** slant board **12** includes a rigid body support **16** which is completely covered by padding **18**. A stabilizing member **20**, such as a rod having high friction material covering the rod is located at one end of slant board **12**. The opposite end of slant board **12** is elevated by a mounting structure which includes upright posts **22** having a plurality of spaced holes **24** into which a lock pin **26** would be selectively inserted by the pulling outward or pushing inward of knob **28**. A further stabilizing member **20** is connected to the bottom of posts **22**. The structure for slant board **12** and the manners of adjustment may take the forms shown and described in copending application Ser. No. 480,645, filed Jun. 7, 1995, all of the details of which are incorporated herein by reference thereto. Thus, the various details in application Ser. No. 480,645 may be incorporated to enhance the use of the slant board either as a separate exercise device or in combination with the abdominal rocker.

As also shown in FIGS. **1–3** a post member **30** is adjustably secured to the elevated end of slant board **12**. A padded cross-member **32** extends outwardly from the exposed upper end of post **30** for engagement with the user's feet or hands in accordance with the particular exercise being done.

If desired, slant board **12** may also incorporate various structural elements to enhance the types of exercises that could be done by utilizing various components disclosed in applicant's co-pending application Ser. No. 689,056 filed Jul. 30, 1996, all of the details of which are incorporated herein by reference thereto. In this respect, such copending application discloses a platform having, for example, a

bench with various other components associated therewith. The bench might be considered as a form of slant board or exercise platform and the associated components described in the copending application may be included in the practice of this invention.

Abdominal rocker **14** is shown in FIGS. **1–3** as including a frame **34** which is of symmetrical construction in that each side of the frame and the various components thereof is identical to the other side. Frame **34** includes a base section **36** which is pivotally mounted adjacent to the rigid body support **16**. This is accomplished by providing a rod **38** which extends from one side of the frame to the other and is located below support **16**. A bracket **39** is secured to the rod on each side of support **16** with a pin, such as a spring pin **40** extending into one of a corresponding set of holes **42** in support **16**. Thus, the mounting of the pins **40** to the support **16** permits the user to lay on padding **18** and rock the frame **34** in a known manner. Such rocking action would be achieved while the head and/or neck of the user is disposed on neck rest **44** and while the user's hands or arms are at padded grip member **46** which extends across frame **34**. If desired, neck rest **44** may be swively mounted to cross bar **60** as shown at swivel mounting **48** to permit the neck rest to be pivoted, for example, 90° or otherwise disposed to an inactive condition during various exercises.

Although the embodiment of FIGS. **1–3** show the adjustable mounting to be accomplished by the series of holes **42**, other means could be used for varying the location of mounting. For example, the upper surface of the slant board **12** or some longitudinal attachment on each side of the slant board having a series of spaced grooves, recesses or dimples in which a post, pin or rod on the base section **36** may be selectively inserted.

An advantage of utilizing rocker **14** in combination with slant board **12** is that the user's feet may engage the cross member **32** or, for example, the strap **50** shown in phantom in FIG. **1**. As shown strap **50** extends through slots **52** in support **16** and is located over and across padding **18**.

A further feature of rocker **14** is that grip section **46** may be adjusted in its elevation. Thus, for example, as best shown in FIG. **1** frame **34** includes outer tubing **54** and inner tubing **56** telescoped therein with spring pins or other fasteners selectively determining the amount of extension of outer tubing **56** from inner tubing **54** by engagement, for example, of a spring pin in one of a number of selected holes **58**.

FIG. **4** shows an alternative form of rocker wherein the frame **34A** is located on only one side of the slant board. Thus, as shown therein the grip section **46A** is cantilevered extending only from one side of frame **34A**.

As illustrated, neck rest **44** is mounted on cross bar **60** which is part of frame **34**. Preferably the neck rest **44** is permanently mounted at the center of cross bar **60**. Where, however, a swivel mechanism **48** is provided to permit the headrest to be moved out of its active position, the invention may also be practiced by permitting the neck rest to slide along cross bar **60** to further move the neck rest to an inactive position. In the embodiment shown in FIG. **4** where the neck rest is mounted on cantilevered cross bar **60** the neck rest could be completely slid off cross bar **60** and thus removed during its inactive position.

As noted, the invention may be practiced with any suitable form of slant board or abdominal rocker. FIGS. **5–6** show, for example, an abdominal rocker having the general type of structure illustrated and described in U.S. Pat. No. 5,492,520, all of the details of which are incorporated herein by reference thereto. Such form of abdominal rocker **14A** could, however, be modified to include a resistance cord **62** anchored at C-hook **64** at one end and anchored to neck rest loop **66** at its other end, thus providing some resistance during the rocking action.

FIG. **6** illustrates additional details which could be utilized with the present invention. As shown therein, the rocking action could be adjusted by incorporating an adjustable friction brake mechanism **68** between frame **34** and bracket **70** mounted to support **16**. Reference is made to U.S. Pat. No. 5,460,586 for details of a suitable friction brake mechanism. All of the details of U.S. Pat. No. 5,460,586 are incorporated herein by reference thereto. The degree of frictional resistance would be controlled by the rotating of lock knob **71**. A friction resistance mechanism can be incorporated in any of the embodiments where appropriate.

FIGS. **7–8** illustrate an alternative manner of adjustably and detachably mounting rocker **14** to slant board **12**. As shown therein a channel member **72** is secured to each side of support **16** to provide a track on each side of the support **16**. Channel **72** may be secured in any suitable manner such as by bolts **74** at each end of the channel member. Frame **34** is dimensioned to fit into the channel **72** and thus the channel acts as a track to permit a rocking action of rocker **14** in the known manner.

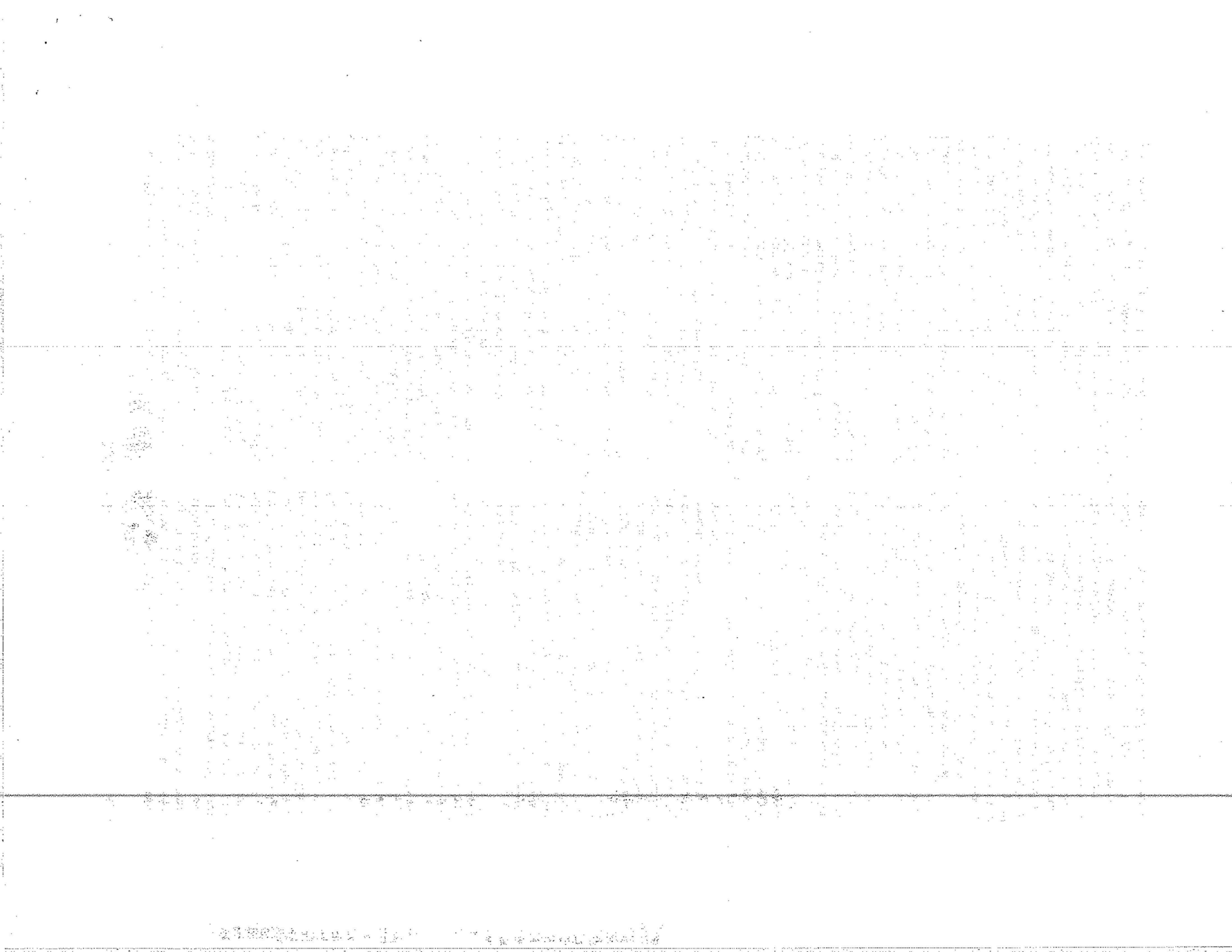
FIGS. **9–10** illustrate yet another form of detachable mounting of rocker **14** to slant board **12**. As shown therein a pin or post **76** extends inwardly from each side of frame **34** and simply rests on the padding **18** of support **16** or preferably on an L-shaped bracket **75** on each side of support **16**. In this embodiment the rocker **14** could roll up or down the slant board similar to the use of tracks **72**.

FIGS. **9–10** also show a practice of the invention where the slant board **12** is completely horizontal. The form of mounting illustrated therein, however, may also be practiced where there is an inclination to the slant board since the user's weight would tend to maintain the rocker in place. Similarly the slant board of other embodiments may be horizontal.

The invention may be practiced by enhancing the exercises possible through the use of additional exercise or resistance components. FIG. **11**, for example, shows the inclusion of rowing arms **78** mounted to each side of slant board **12**. Reference is made to copending application Ser. No. 480,645 for details of such rowing arms.

In addition, FIG. **11** shows the provision of at least one weight **80** mounted to a non-elastic cord **82** with one or two loops **84** at the other end through which the user's arms or legs would be placed with the cord **82** extending over cross piece **32** or around a pulley on cross piece **32**.

FIGS. **12–13** show a modification of rocker **14** which represents a distinct departure from the prior art and in itself is a novel form of rocker. As shown therein the rocker **14** includes a device **86** held in the hand or mounted on the legs, but placed directly on the abdomen. Such device **86** incorporates a resistance mechanism to develop the midsection. Device **86** might thus be considered as an abdominal flex device. Basically, the rocker **14** would have the same type of structure previously described but would also include the abdominal flex device **86** which comes in contact with the abdomen. In the illustrated form the abdominal flex component **86** includes a bar **88** that is mounted to frame **34**. A centrally mounted outer member **90** is secured to rod or bar **88** extending toward the abdomen. An inner member or shaft **94** is slidably mounted in outer member **90**. Alternatively, member **94** may slide along side of member **90**. Inner member **94** terminates in a padded abdomen contacting



member **92** extending across inner member **94**. As best shown in FIG. **13** padded member **92** is urged into contact with the abdomen by some adjustable resistance mechanism such as a spring mounted within outer member **90** and disposed against inner member **94**. Thus, when the user rocks forward, varying degrees of resistance would apply to the abdominal muscles. The normal extension of inner member or shaft **94** from outer member **90** could be located at different positions to bring it closer to or further from the abdomen, to exert greater or lesser pressure on the midsection and to benefit people of different sized midsections.

In order to facilitate the user sliding under bar **88**, rocker **14** is preferably of one-sided frame construction such as shown in FIGS. **4** and **14**, thereby leaving an open side. If desired bar **88** may be vertically adjustably mounted to frame **34**. FIG. **12** illustrates frame **34** to have telescopic tube sections to which device **86** is mounted. Thus, the bar could be initially raised until the user slides into position and then the bar **88** could be lowered for optimizing its operative location.

FIG. **14** illustrates a variation of the invention wherein the slant board **12** includes a combined elevating and cross member structure. As shown therein the elevated end of slant board **12** has a stabilizing leg **20** which would rest on the floor in the same manner as the stabilizing leg **20** at the other end of the slant board **12**. The elevating mechanism would include an outer member **96** and an inwardly telescoped member **98** with the vertical positioning between the two being controlled by locking member **100** disposed in selected holes **102**. A cross member **32** is provided at the top of the elevating mechanism disposed above the upper surface of the inclined support. A further cross member **104** is located below the surface of the support for various optional exercises.

FIG. **14** also illustrates the form of rocker **14A** shown in FIG. **4** wherein the frame **34A** is located at only one side of the slant board.

FIG. **15** illustrates a further variation of the invention wherein the frame **34** may be pivoted below slant board **12** during periods of non-use. This could be accomplished by either mounting the rocker **14** close enough to one end of the slant board so that it could be rotated completely around from above to below the slant board or by making the length of frame **34** extendable to provide sufficient clearance to pivot completely around to the opposite side of the slant board. In order to pivot the frame **34**, it might first be necessary to contract or temporarily detach the elevating structure at the upper end of board **12**.

As shown in FIG. **15** resistance cords **106** are provided at one end of the slant board. The resistance cords could be placed between the thighs or feet or lower legs or ankles during various exercises.

It is to be understood that the combination exercise device may be used with the user's head at the upper end or at the lower end of the slant board depending upon the particular exercise being done.

FIG. **16** shows a rocker **14** which is expandable in width so as to fit over various sizes of slant boards or simply provide a wider rocker when the rocker is used alone. This is accomplished by making the grip member **46B** and the neck or head rest rod **60B** and the interconnecting frame rod **38** expandable such as being telescopic members. In the embodiment shown in FIG. **16** the abdominal flex unit **86** is also included and would have an expandable connecting rod **88**.

The various embodiments previously described show the rocker **14** to be mounted directly to and thus supported by the slant board **12**. FIG. **17**, however, illustrates a variation of the invention wherein there is no physical connection between the rocker **14** and slant board **12**. Rather, in the embodiment shown therein the cross member **38** is located beneath but out of contact with the support **16**, while the neck rest or head rest **44** and grip section **46** would be located above support **16**.

In its broad aspect the invention consists of combining an abdominal rocker and a slant board. Preferably the two units are detachably mounted together so that either unit could be used individually or both could be used in combination. While it is preferable to mount the rocker directly to the slant board, as shown in FIG. **17** there need be no physical connection and portions of the rocker could actually be below the slant board.

The invention could be practiced where the rocker is structured to attach to only one specific slant board. Alternatively, and preferably, however, the rocker should be capable of attachment to various types of benches or slant boards. Similarly, the slant board could be structured for attachment or use with only one specific abdominal rocker. Alternatively, the slant board could be structured for attachment to different types of rockers.

Any suitable manner of mounting of the rocker and slant board may be utilized such as grooves, tracks, pivots, pins/holes, clamps/clips, screws sliding onto pressure fit or dropping onto or over structure. The mount for the rocker may have only one position, but preferably could be in a number of selected positions.

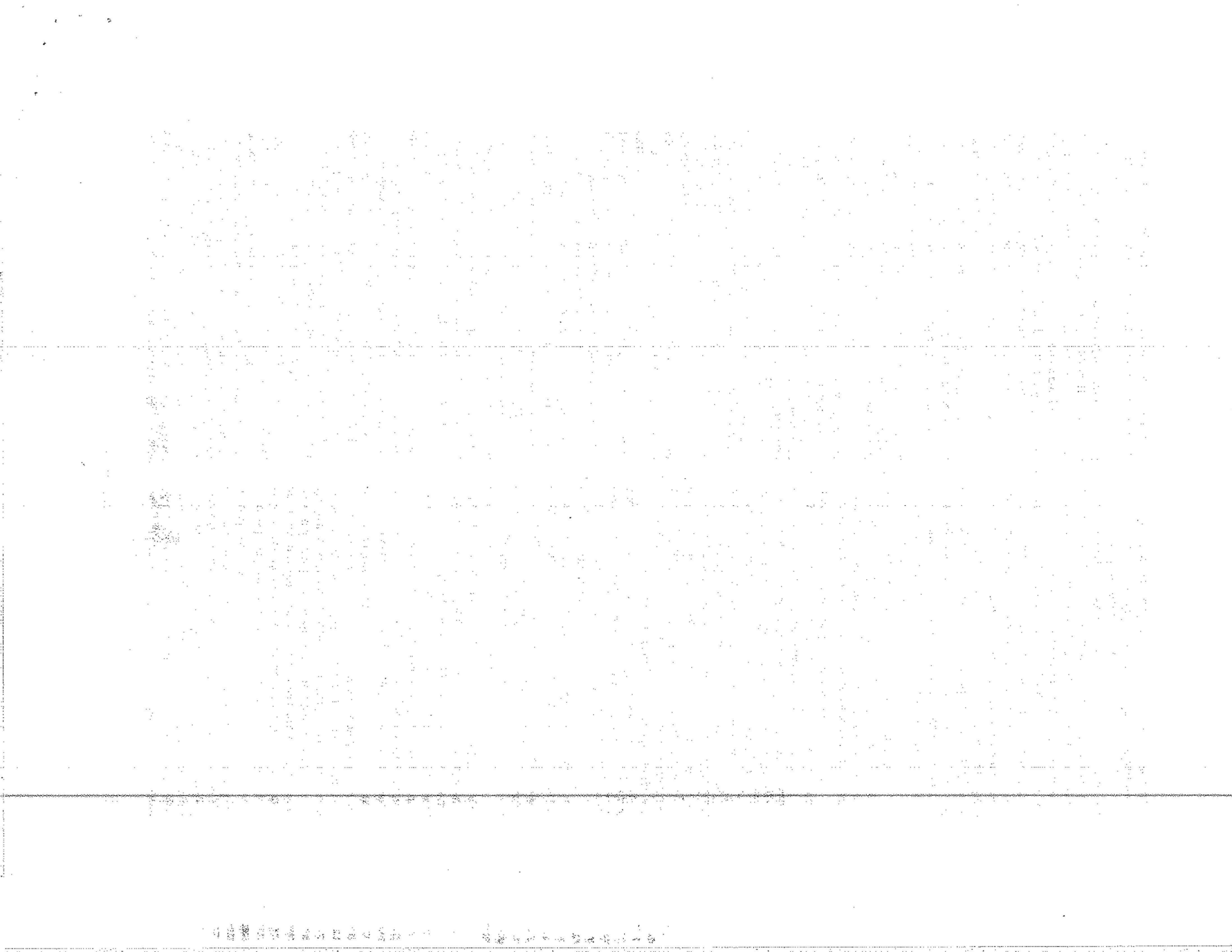
The invention could be practiced with various types of exercises. The preferred, but not sole intent, however, is to exercise the abdominal and back muscles. The invention could be also used for exercising the arms, chest, hips and legs. Typical abdominal exercises could include crunches, sit-ups (either flat or inclined), rocking sit-ups (either flat or inclined) and bent/straight leg lifts. Typical back exercises include leg lifts with or without resistance, hyper extensions, backward rocking and rowing. Typical arm and leg exercises would include rowing, push-ups, leg raises and leg pull downs. The invention may be practiced where the rocker is permanently attached to the slant board or preferably where it is detachable. Alternatively, the rocker or various components thereof could be repositioned to be located out of the way during periods of non-use. FIG. **15**, for example, illustrates a fold down non-use position of the rocker.

It is to be understood that while various embodiments have been described having various features, the invention may be practiced utilizing features of different embodiments with each other within the spirit of this invention.

What is claimed is:

1. A combination exercise device comprising a slant board and an abdominal rocker, said slant board comprising a rigid body support having a first one end and a second other end, elevating structure connected to said one end for elevating said one end above said other end to incline said body support, said abdominal rocker including a frame having two base sections, each of said base sections pivotally mounted to a respective side of said slant board, said frame including a grip section joined to and extending from said base sections, a neck rest mounted to said frame between said base sections, said grip section and said neck rest being located above said body support, and each of said base sections being mounted to rod structure disposed under and across said slant board.

2. The device of claim **1** wherein said abdominal rocker is adjustably mounted to said slant board by mounting



structure located at said base sections to vary the location of said rocker on said slant board.

3. The device of claim 2 wherein said mounting structure comprises a series of holes in said body support, and a locking member in said base section for selective engagement with one of said holes.

4. The device of claim 2 wherein said elevating structure includes a post mounted to each of said base sections and resting on said body support.

5. The device of claim 1 wherein said neck rest is pivotally mounted to said frame to be selectively moved to an inactive condition during non-use of said rocker.

6. The device of claim 1 wherein said rocker includes horizontal members slidably mounted against each other whereby said rocker is expandable in width.

7. The device of claim 1 wherein said elevating structure includes vertical members slidably mounted against each other to vary the elevation of said slant board including permitting said slant board to be disposed in a horizontal position.

8. The device of claim 7 wherein the upper surface of said body support is padded.

9. The device of claim 1 including a cross support mounted to said elevated one end of said body support and disposed above said body support.

10. The device of claim 1 including a strap secured to said body support and extending across the upper surface of said body support.

11. The device of claim 1 wherein said rocker is detachably mounted to said slant board.

12. The device of claim 1 wherein said grip section includes a bar extending from said frame over and across said body support, said frame including a first member connected to said bar and a second member connected to said base section, and said first and said second members being slidably mounted with respect to each other to vary the elevation of said grip section above said body support.

13. The device of claim 1 wherein said elevating structure for elevating said one end of said slant board includes vertical members slidably mounted against each other for disposing said slant board at at least two different positions.

14. The device of claim 13 wherein said base section is of sufficient length to dispose said grip section to be movable along an arc which extends outwardly beyond said second other end of said body support.

15. The device of claim 1 wherein said neck rest is mounted on an elongated rod, and connecting structure securing said elongated rod to said frame.

16. The device of claim 15 wherein said rocker is mounted at said second other end of said body support, and a cross member mounted at said first one end of said body support disposed above said body support.

17. The device of claim 1 wherein said neck rest is mounted to a rod connected to said frame, and said grip section comprising a generally horizontal member connected to a downwardly extending base section member at each end thereof.

18. A combination exercise device comprising a slant board and an abdominal rocker, said slant board comprising a rigid body support having a first one end and a second other end, elevating structure connected to said first end for elevating said first end above said second end to incline said body support, said abdominal rocker being located at said second end, said abdominal rocker including a frame having two base sections, each of said base sections pivoted to a different side of said slant board, said base sections being connected to each other by rod structure disposed under and across said slant board, said rocker including a neck rest disposed between said base sections, said neck rest being mounted on an elongated rod, a grip section mounted to and between said base sections with said neck rest being disposed between said grip section and said slant board, and said base sections being of sufficient length to dispose said grip section to be movable along an arc beyond said second end of said body support.

19. The device of claim 18 wherein said body support is padded, and a cross member located at said one end of said slant board at a height above said body support.

20. A combination exercise device comprising a slant board and an abdominal rocker, said slant board comprising a rigid body support having a first one end and a second other end, elevating structure connected to said first end for elevating said first end above said second end to incline said body support, said abdominal rocker being located at said second end, said abdominal rocker including an open frame made of rod type members including two base sections, each of said base sections pivoted to a different side of said slant board, said base sections being connected to each other by a rod type member having a grip section, said grip section and said base sections being pivotally movable along an arc, said rocker including a neck rest connected to said frame, said neck rest being separate and distinct from said body support, said neck rest being mounted on an elongated rod type member which is mounted between said base sections below said grip section, said neck rest being located within the arc resulting from the pivotal movement of said grip section and said base sections, and the radial distance from said grip section to the pivot location of said base sections to said slant board being greater than the radial distance from said pivot location to the outer edge of said slant board at said second other end wherein the user lies in a substantially supine position on said slant board, positions the user's neck on said neck rest, grips the grip section and performs abdominal exercises.

21. The device of claim 20 including resistance structure mounted to said rocker to resist the pivoting movement of said rocker.

22. The device of claim 21 wherein said resistance structure comprises a friction brake located at said base section where said base section is mounted to said body support, and said friction brake being adjustable with respect to the amount of resistance provided by said friction brake.

23. The device of claim 21 wherein said resistance structure comprises at least one elastic cord mounted to said slant board and said abdominal rocker.

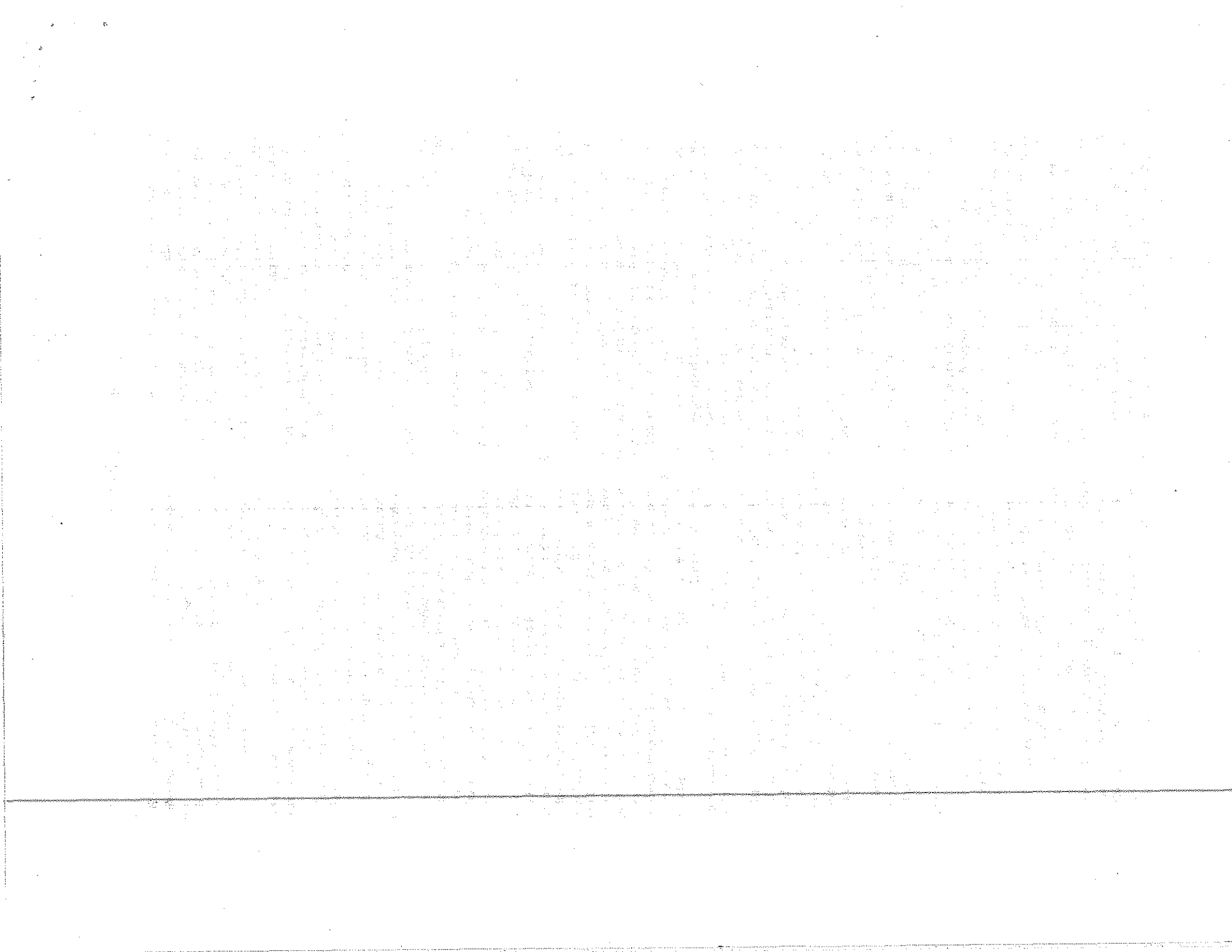
24. The device of claim 20 wherein said rocker is pivotally mounted to said slant board by mounting structure which permits said rocker to be moved to a position below said slant board during periods of non-use.

25. The device of claim 20 including a rowing arm mounted on each side of said body support.

26. The device of claim 20 including a weight unit mounted at one end of said body support, said weight unit comprising a cord for attachment to the user and a weight secured to said cord.

27. The device of claim 20 including an abdominal flex unit secured to said rocker, and said abdominal flex unit having a body contacting member for contacting the user.

28. The device of claim 27 wherein said abdominal flex unit includes a bar extending from said frame in the general location where said base section is pivotally mounted adjacent to said body support, a first member mounted to said bar and extending toward said neck rest, a second member slidably mounted to said first member, said body contact



member being secured to the exposed end of said second member, and resistance means reacting against said second member to provide a resistance force to the movement of said second member.

29. The device of claim **20** including detachable weights mounted to one of said slant board and said rocker.

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