

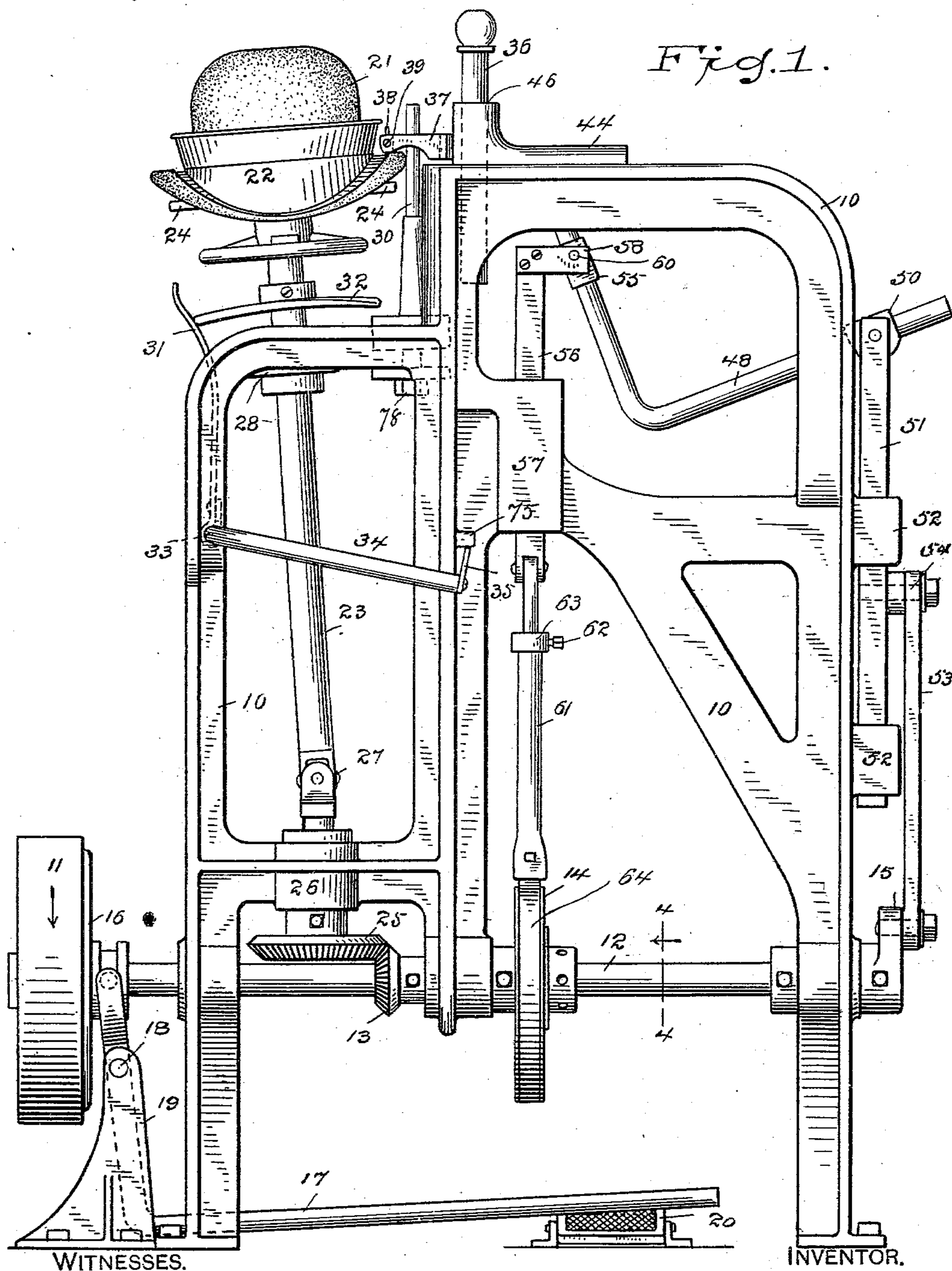
No. 757,542.

PATENTED APR. 19, 1904.

F. C. CRAW.
HAT TRIMMING MACHINE.
APPLICATION FILED AUG. 10, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



WITNESSES.

INVENTOR.

H. A. Lamb.
J. W. Atherton.

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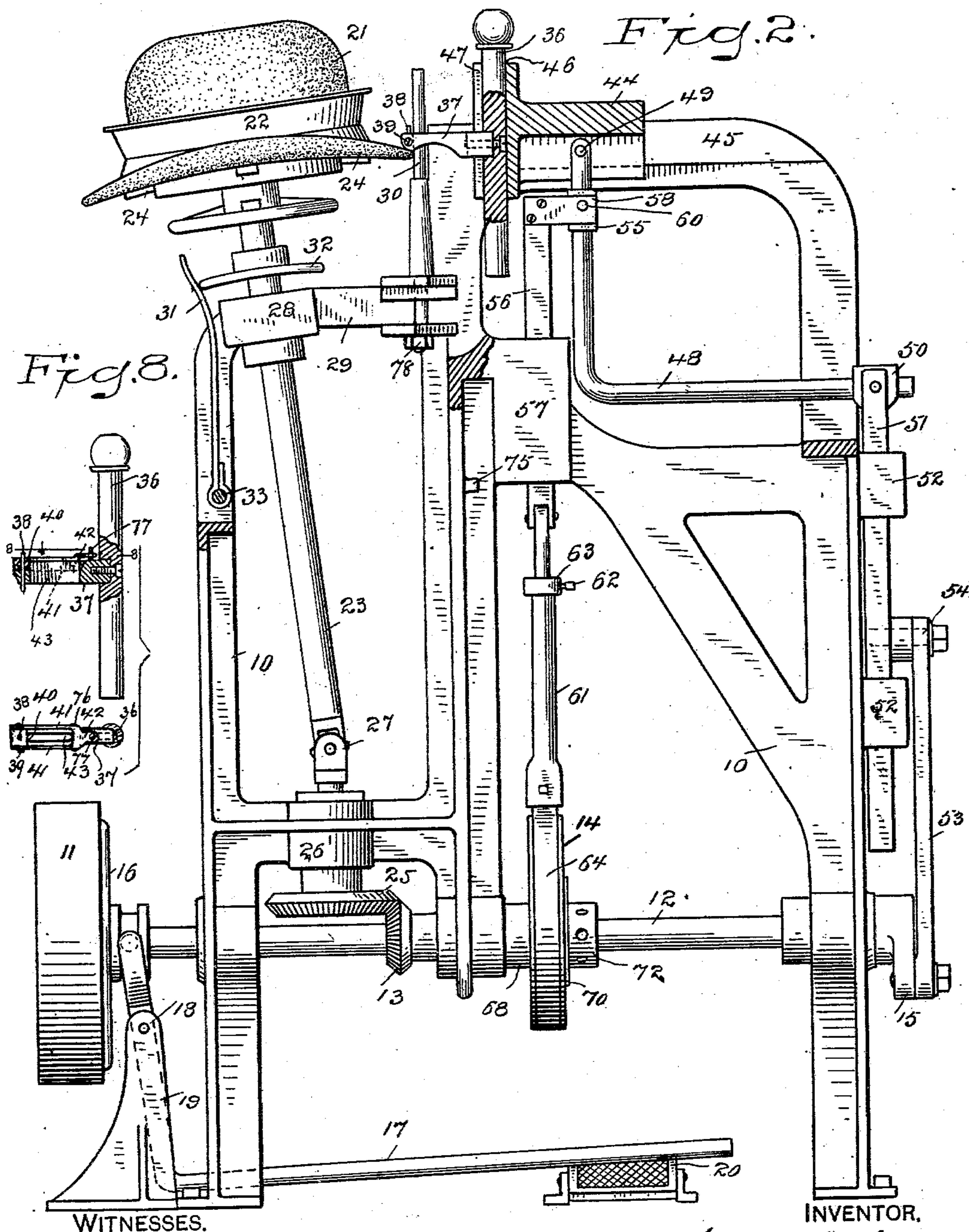
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3 SHEETS—SHEET 2.

NO MODEL.



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3 SHEETS—SHEET 3.

Fig. 3.

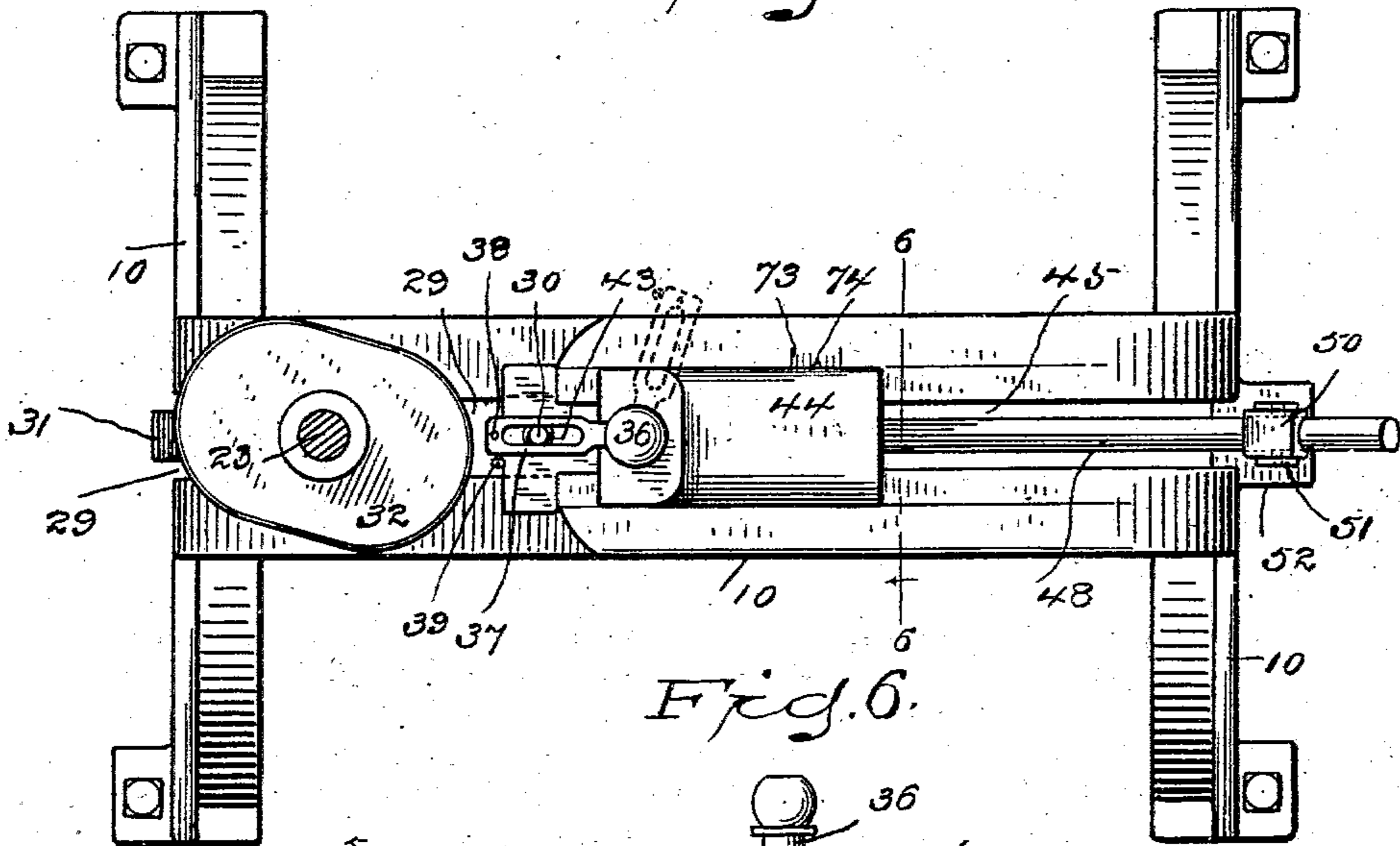


Fig. 6.

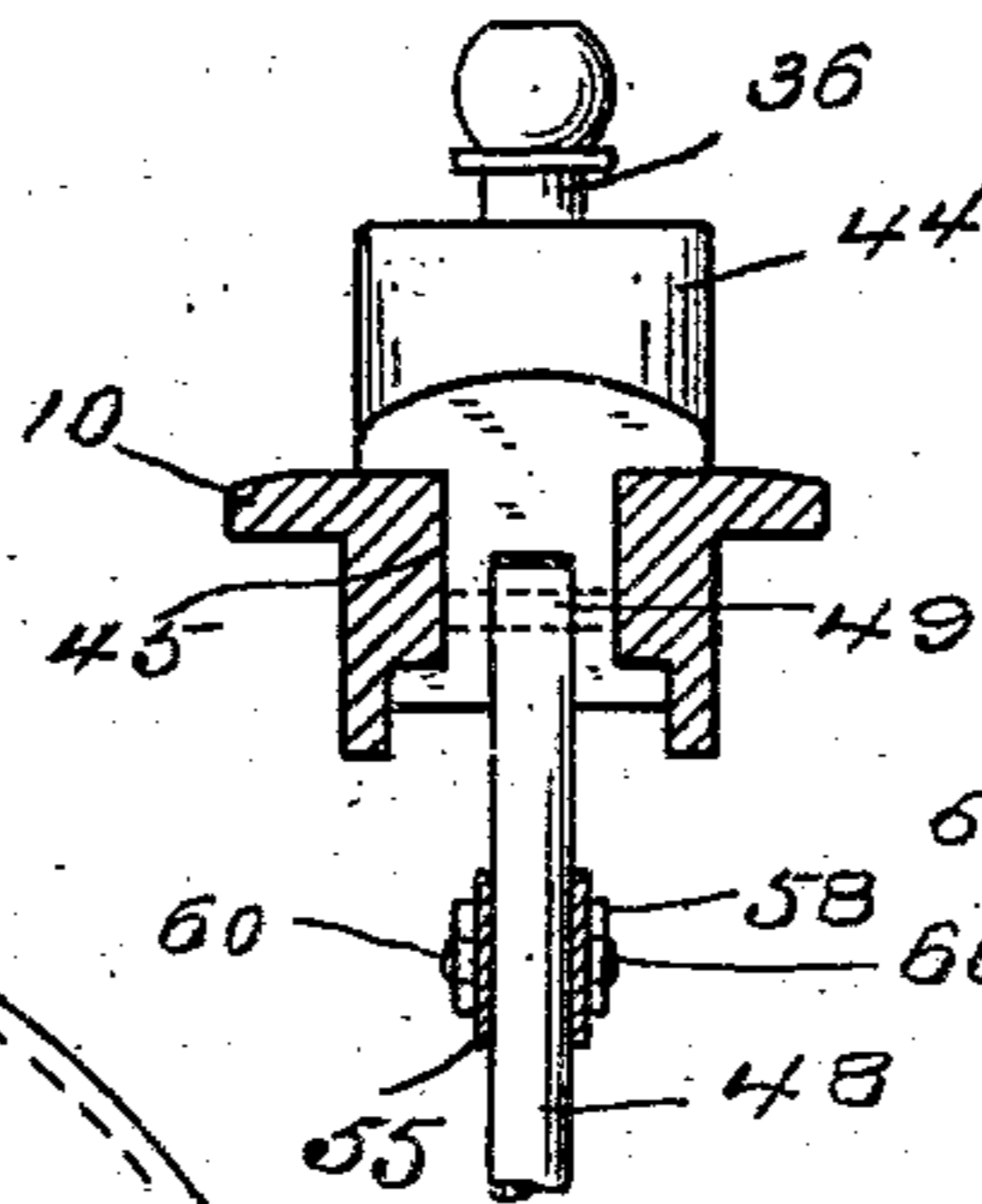


Fig. 4.

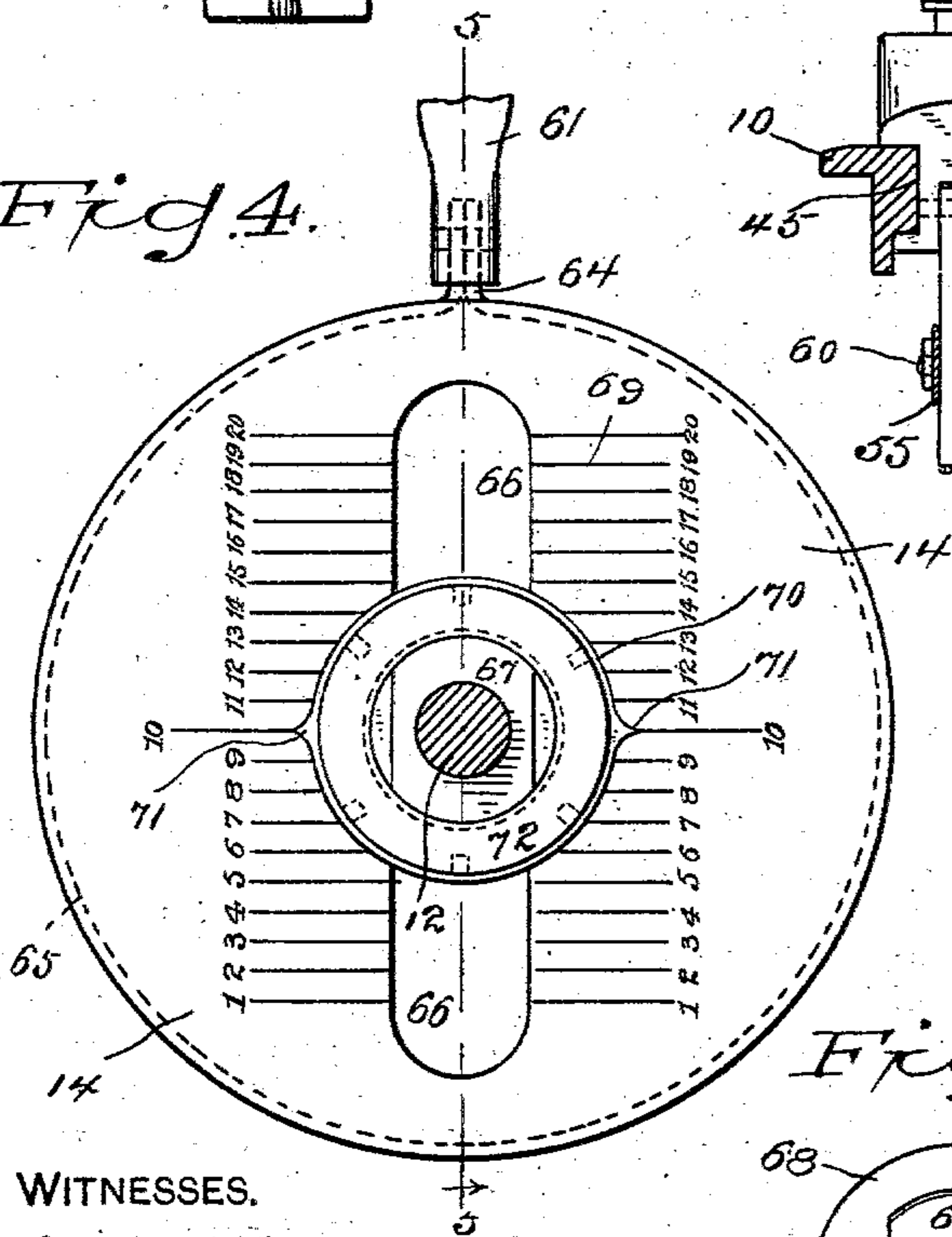


Fig. 5.

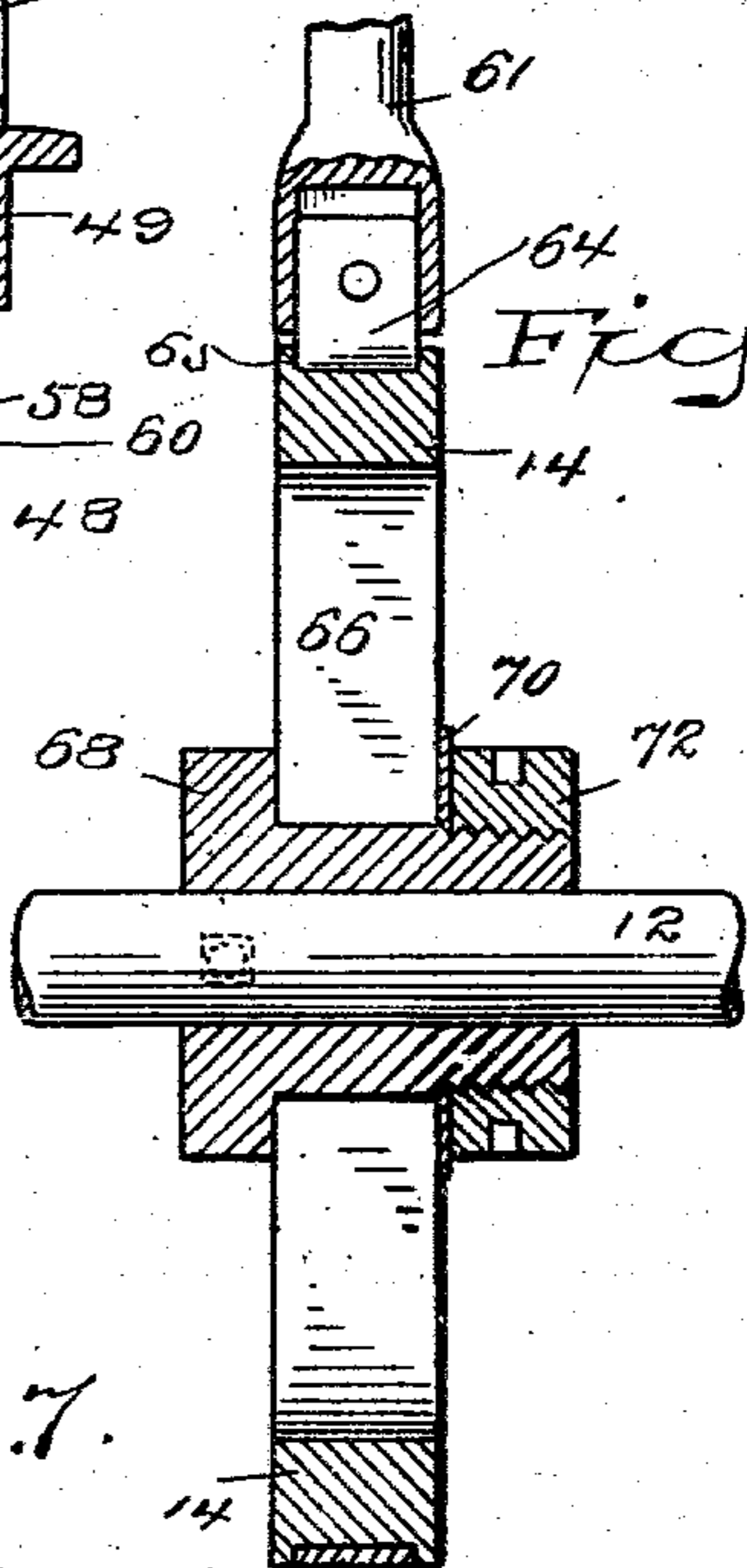
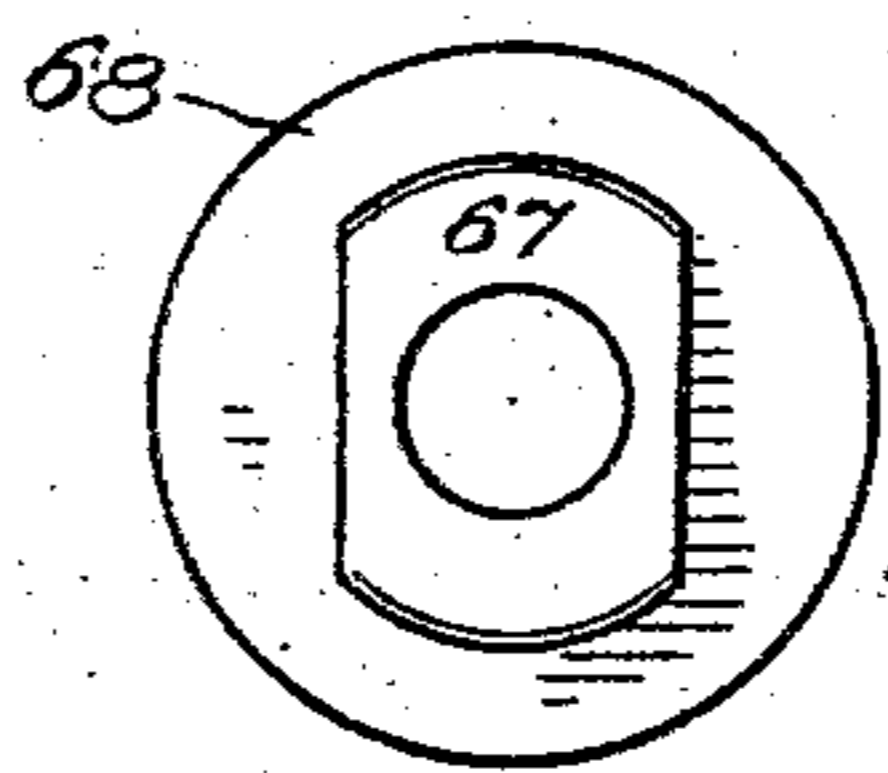


Fig. 7.



WITNESSES.

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UNITED STATES PATENT OFFICE.

FRANK C. CRAW, OF SOUTH NORWALK, CONNECTICUT, ASSIGNOR OF ONE-HALF TO WILLIAM N. CRAW, OF SOUTH NORWALK, CONNECTICUT.

HAT-TRIMMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 757,542, dated April 19, 1904.

Application filed August 10, 1903. Serial No. 168,979. (No model.)

To all whom it may concern:

Be it known that I, FRANK C. CRAW, a citizen of the United States, residing at South Norwalk, county of Fairfield, State of Connecticut, have invented a new and useful Hat-Trimming Machine, of which the following is a specification.

This invention relates to certain improvements in machines for performing the operation variously known as "trimming," "paring," or "planing" the brims of curled hats.

It is one of the objects of this invention to produce an automatic machine for this purpose that will perform the operation while the hats are still upon the matrices or blocks upon which they are curled, as in my former patent, No. 707,392, dated August 19, 1902.

A further object of the invention is to produce a machine of the character described that shall be self-adjusting to heights of curl and sizes of hat, shall be provided with a simple and convenient adjustment for determining the widths of "curls," so called—that is, the width of the curl at the sides of the brim—and with another equally simple adjustment for determining the styles of the "curls," so called—that is, the widths of the curls at the four quarters of the brim.

A further object of the invention is to simplify, cheapen, and to generally improve the construction and mode of operation of the entire machine.

With these and other objects in view the invention consists in certain constructions and in certain parts, improvements, and combinations, which will be hereinafter described and then specifically pointed out in the claims hereunto appended.

In the accompanying drawings, forming a part of this specification, Figure 1 in an elevation of the machine complete, the cutter being shown as operating at one side of a brim and the eccentric disk adjusted to trim less than medium quarters; Fig. 2, a vertical longitudinal section of the framework, the operative parts being in elevation and the cutter shown as operating at one end of a brim; Fig. 3, a plan view, the hat-holder and hat be-

ing removed; Fig. 4, an elevation, on an enlarged scale, of the eccentric disk which determines the style of the brims; Fig. 5, a section on the line 5 5 in Fig. 4; Fig. 6, a detail sectional view on the line 6 6 in Fig. 3 looking toward the left; Fig. 7, an elevation of the hub which carries the eccentric disk detached; and Fig. 8 comprises both a sectional elevation and a sectional plan view, the latter being on the line 8 8 of the former, illustrating a form of cutter-carrier in which the cutter is carried by a spring instead of being rigidly secured to the carrier.

10 denotes the framework as a whole, which may be of the ordinary or any preferred construction.

Power is applied to drive the machine by means of a belt (not shown) passing over a belt-pulley 11, running loose on a shaft 12, journaled in the framework and carrying a bevel-pinion 13, an eccentric disk 14, and a crank 15. The belt-pulley is connected to and disconnected from the shaft by means of a clutch 16, operated by means of a lever 17, in the present instance a bell-crank lever, pivoted, as at 18, to a bracket 19, the free end of which rests upon a treadle or foot-lever 20, the parts being shown as arranged so that by placing the foot on the treadle and pressing the front end down the clutch-lever is operated to connect the belt-pulley with the shaft.

21 denotes a curled hat on the matrix 22, on which it has been curled, which is secured to a carrying-shaft 23 by means of an expansion-holder 24, which may be of any ordinary or preferred construction. The lower end of the carrying-shaft is provided with a bevel gear-wheel 25, which meshes with bevel-pinion 13 and is journaled in a bearing 26 on the framework. Above the bearing is a universal joint 27 to permit the necessary movement of the upper end of the shaft which carries the hats while being operated on. The upper bearing of the carrying-shaft is in a block 28, which is adapted to slide freely in a slot 29 in the framework. The brim of a hat while being operated upon is retained in engagement

with a bearing-rod 30, presently to be described, and which is rigidly but adjustably secured to the framework by means of a spring 31, which bears against an oval plate 5 32, carried by shaft 23. The peripheral configuration of this plate corresponds substantially with the ordinary oval of a hat-brim, and it is secured to the shaft with its long diameter at right angles to the long diameter 10 of a hat-brim while being operated upon. This is in order to equalize the pressure of the edge of the brim against the bearing-rod, the spring exerting most power when the sides of a brim are in engagement with the 15 rod and the least power when the ends of the brim are in engagement with the rod, as will be obvious from Figs. 1 and 2. Spring 31 is rigidly secured to a rock-shaft 33, which is journaled in the framework and is provided 20 with an arm 34, which extends conveniently contiguous to the framework and is provided at its free end with a locking-button 35, which is adapted to engage a lug 75 on the framework to lock the shaft and the spring in the 25 operative position. In removing a hat from the carrying-shaft or placing a hat thereon the locking-button is oscillated to disengage the arm and rock-shaft and permit the spring to swing backward out of the way without 30 pressure on the oval plate. As soon as a new hat has been secured to the carrying-shaft it is moved into position to be operated upon. Arm 34 is swung downward, as in Fig. 1, and is locked there by turning the locking-button 35 into engagement with the lug, the spring acting to press the outer edge of the brim against the bearing-rod.

36 denotes the cutter-carrier; 37, the cutter-arm, which is rigidly secured thereto, and 38 40 the cutter, which in Figs. 1, 2, and 3 is shown as rigidly secured to the cutter-arm, as by a set-screw 39. In Fig. 8 I have illustrated a modification in which the cutter is secured in the same manner to a block 40, which is rigidly secured to the arms 41 of a spring 42, 45 which is itself pivoted, as at 76, to the rear end of the cutter-arm, the tension of the spring being adjusted by a set-screw 77. In both forms the cutter-arm is provided with a slot 43, through which bearing-rod 30 passes 50 freely. The cutter-carrier is itself carried by a cross-head 44, adapted to reciprocate in a slot 45 in the top of the framework. The cutter-carrier in the present instance is 55 shown as a round rod, although its shape is immaterial so far as the principle of the invention is concerned and is adapted to reciprocate in a vertical opening 46 in the cross-head. The cutter-arm reciprocates in a ver- 60 tical slot 47 in the cross-head which leads into the opening. When not in use or when removing a trimmed hat and placing another in position to be operated upon, the cutter-carrier is lifted up, so that the cutter-arm is free 65 from slot 47 and also from the bearing-rod,

which normally passes through slot 43 in the cutter-arm, after which the cutter-carrier is given a quarter-turn, more or less, backward, so that the cutter-arm will rest upon the top of the cross-head, as in dotted lines in Fig. 3, 70 and be wholly out of the way. As soon as another hat has been placed on the expansion-holder in position to be operated upon the cutter-carrier is swung around so that the cutter-arm will register with slot 47 and is 75 then allowed to drop down to place, as in Figs. 1 and 2. It will be noted that in use the cutter-arm rests upon the top of the curl and rises and falls freely in accordance with the rise and fall of the curl, it being wholly im- 80 material so far as the operation of the machine is concerned whether the curls are high, low, or medium, and changes may be made from one to the other without making any changes whatever in the adjustment of the 85 machine. It will be noted, furthermore, that in use the outer edge of the curl is retained constantly in engagement with the bearing-rod, it being therefore wholly immaterial so far as the operation of the machine is con- 90 cerned whether the hats are large or small or of medium size or how often changes are made in the sizes of the hats being operated upon, as no changes whatever are required in the adjustment of the machine. The path trav- 95 eled by the cutter when the machine is in operation whereby both the width and the style of the curls is determined is regulated in the manner I will now explain.

48 denotes an operating-lever—in form an 100 angle-lever—one end of which is pivoted to the cross-head, as at 49. The other end of the operating-lever is adapted to slide freely through a block 50, which is itself pivoted to the upper end of a slide 51, adapted to re- 105 ciprocate in guides 52 on the framework. This slide is operated by means of a link 53, one end of which is pivoted to crank 15 and the other to the slide, as at 54. An important feature of this operating-lever is that it 110 is provided with a variable or shifting fulcrum—in the present instance a block 55—through which the lever slides freely and which is pivoted to a slide 56, adapted to re- 115 ciprocate in a guide 57 on the framework. I have shown the block 55 as pivoted, as at 60, between arms 58, extending from the slide, although it will of course be understood that the special details of construction and arrange- 120 ment are not of the essence of the invention.

61 denotes an adjustable eccentric-rod, the 125 the upper end of which is pivoted to slide 56. This eccentric-rod is shown as made telescopic, one part sliding within the other, and as locked in position after adjustment by a set-screw 62 in a collar 63 at the upper end of the tubular portion of the rod. Attached to the lower end of the eccentric-rod is an ec- 130 centric-strap 64, which incloses eccentric disk 14, carried by shaft 12, the strap being shown

as lying in a groove 65 in the periphery of the disk.

The adjustment for different widths of curls—that is, width of curls at the sides of the brims—is effected by means of the set-screw 62. This adjustment is made when the crank is up, as in Fig. 1, as at that time the hat is in position for the cutter to operate upon the side of the curl. When the parts are in this position, set-screw 62 is loosened and slide 56 is moved up or down, as may be required, the operating-lever sliding freely at all times through blocks 50 and 55 and one part of the eccentric-rod sliding within the other. If the eccentric-rod is shortened and slide 56 moved downward, the fulcrum of the operating-lever will be lowered, thereby increasing the throw of the cross-head, and a wider curl will result, as the cutter will be moved farther toward the left as seen in Fig. 1 at the sides of the curl. If the eccentric-rod is lengthened, the fulcrum of the operating-lever is raised, thereby decreasing the throw of the cross-head, and a narrower curl will result. For convenience in making this adjustment where the width of curl required is known I provide a scale 73 on the top of the framework (see Fig. 3) and a corresponding point 74 on the cross-head. The scale may in practice be graduated to sixteenths of an inch. If a five-eighths—i. e., ten-sixteenths—curl is desired, the operator, after loosening set-screw 62 simply moves slide 56 up or down, as may be required, sufficiently to move the cross-head into such position that point 74 will register with the corresponding graduation. If the exact width of curl has not been determined in advance, the operator simply moves slide 56 up or down, as may be required, until the cutter is in position to trim to the desired width of curl at the sides of the brim without regard to the scale. The rule is, in brief, to shorten the eccentric-rod, thereby increasing the throw of the cross-head when wider curls are required, and to lengthen the eccentric-rod, thereby decreasing the throw of the cross-head when narrower curls are required, the adjustment being always made when the crank is up.

The operation of the eccentric disk is a vitally-important part of the present invention, as its adjustment varies the position of the fulcrum of the operating-lever and determines what I have termed the “style” of the curl—that is, the width of the curl at the four quarters as distinguished from its width at the sides. In order to avoid the possibility of confusion, I will again explain that the term “width” as applied to the curl of a hat-brim in this specification means the width of the curl at the sides of the brim, and the term “style” as applied to the curl of a hat-brim has reference to the width of the curl at the quarters of the brim. The disk is shown as provided with a central transverse slot 66, which re-

ceives the flattened portion 67 of a hub 68, which is rigidly secured to shaft 12. Upon the face of the disk I provide a scale 69, which may for convenience be a double scale and may be graduated, for example, from “1” to “20,” each numeral corresponding to an arbitrary style of curl. For example, the numeral “10” may correspond to a medium style of curl—that is, a curl of medium width—as, for example, three-eighths of an inch at the quarters. The numerals above “10” in the arrangement of scale illustrated correspond to varying styles of curls all having relatively wide or full quarters, the style having the extreme widest quarters of all being designated by the numeral “20.” The numerals below “10” in the arrangement of scale illustrated correspond to different arbitrary styles of curls each of which is of less than medium width at the quarters, the style having the extreme narrowest width at the quarters being designated by the numeral “1.” For convenience in setting the disk I provide a plate 70, having points 71 adapted to register with the different numerals in the scale. The end of part 67 of the hub is threaded to receive a nut 72, plate 70 lying on the inner side of the nut and being clamped between the disk and the nut, as clearly shown in Fig. 5. It will be understood from the above that the eccentricity of disk 14 relative to shaft 12 determines the variation of the fulcrum of the operating-lever, and consequently the style of the curl. To produce what is termed a “medium” style—that is, curls having a medium width at the quarters—no variation of the fulcrum of the operating-lever is required, and consequently no eccentricity whatever of the disk, said disk being set concentric with the shaft, to effect which adjustment the nut is loosened and the disk moved in either direction on the shaft until points 71 register with the numeral “10” in the scale. The changes in style may be made in just as small fractions of an inch as may be necessary to meet the requirements of the trade, it being understood that each numeral in the scale corresponds to an arbitrarily-fixed style of curl. If the desired style calls for relatively narrow quarters, the nut is loosened, and if the crank is down, as in Fig. 2, the disk is moved up until points 71 register with the numerals in the scale representing the desired style of curl. If wider or fuller quarters are desired, the disk is moved in the opposite direction—that is, down if the crank is down. It is wholly unnecessary, however, to place the crank in any special position for the purpose of making this adjustment. With the arrangement of scale illustrated in the drawings if wider or fuller quarters are required the disk is moved in the direction of the crank. If narrower quarters are required, it is moved in the opposite direction. Pinion 13 and gear-wheel 25 bear the relation to each other of one

to two. Consequently the crank and connections will cause the cross-head carrying the cutter to make two movements in each direction during each rotation of the hat that is being operated upon. It is obvious that the movements of the cross-head are determined by two factors—first, the adjustment of the eccentric-rod, which determines the width of the curl, and, second, the adjustment of the variable fulcrum of the operating-lever by means of the eccentric disk, which determines the style of the curl. As already stated, when the disk is set concentrically on the shaft there will be no variation of the fulcrum of the operating-lever, and the curl will be trimmed with medium quarters without regard to the width of the curl. Suppose now that without change in the width of the curl fuller quarters are desired. The operator loosens nut 72 and moves the eccentric disk in the direction of the crank so that points 71 register with numerals in the scale above "10." The mechanical effect of setting disk 14 eccentrically on the shaft is to cause a variation in the fulcrum of the operating-lever—that is, a movement of said fulcrum in each direction during each rotation of the shaft. When the eccentric disk is set to produce fuller quarters, slide 56, upon which the operating-lever is fulcrumed, moves upward with the crank and slide 51, which actuates the operating-lever. This adjustment is effective at the quarters of the curl only, for the reason that while the fulcrum of the operating-lever is at the same position as before at the sides of the curl owing to the adjustment of the eccentric disk the variable fulcrum will be lower than before at the quarters and will consequently increase the throw of the cross-head while each of the quarters is being operated upon by the cutter. In Fig. 1 I have illustrated the opposite adjustment of the eccentric disk—that is, an adjustment to trim less than medium quarters. With this adjustment slide 56 will move downward while the crank and slide 51 are moving upward, the result being that at the quarters the variable fulcrum of the operating-lever will be higher than before, and consequently the throw of the cross-head will be lessened when the quarters are being operated upon. In Fig. 2 I have illustrated a position of the parts when the end of a curl is being trimmed. This position is ordinarily the same, the brim being trimmed to a one-sixteenth curl at the ends. Should a wider curl, however, be required at the ends, which is unusual, it can be obtained by moving bearing-rod 30 toward the right as seen in Fig. 2. To do this, the operator simply loosens the nut 78, by which it is locked in place, adjusts the bearing-rod as required, and tightens up the nut again. It should be noted that the operating-lever is so shaped that at the instant either end of a curl is being trimmed the portion of said lever at which

the fulcrum is located will lie parallel with slide 56 and the cross-head will lie at its normal position.

The operation of the machine as a whole has already been so fully described as to hardly require further explanation. In placing hats on the machine or removing them therefrom the cutter-carrier is lifted and the cutter-arm and cutter turned backward out of the way and locking-button 35 is turned backward to release arm 34 and the spring which bears against the oval plate. The operator then loosens the expansion-holder and removes the matrix and trimmed hat from the machine. Another matrix with an untrimmed hat thereon may then be attached to the carrying-shaft by means of the expansion-holder. Supposing of course that the two adjustments for width and style of brim have been made, the operator simply drops the cutter-carrier to place, turns the locking-button into position to cause spring 31 to bear against the oval plate, and then places his foot on the treadle, which causes the clutch to connect the driving-pulley with shaft 12.

Having thus described my invention, I claim—

1. In a machine of the character described the combination with means for rotating a curled hat and means for retaining the hat in position to be operated upon, of a vertically-movable cutter-arm adapted to rest upon the top of the curl, and means for automatically moving the hat laterally toward and from the cutter.
2. In a machine of the character described the combination with a matrix and a shaft by which it is carried, of a cutter and a vertically-movable cutter-arm adapted to rest upon the top of the brim of a curled hat on the matrix, and means for automatically moving the hat laterally toward and from the cutter.
3. In a machine of the character described the combination with a matrix and a shaft by which it is carried, of a cutter, a vertically-movable cutter-arm by which it is carried and which is adapted to rest upon the top of the curl of a hat on the matrix and a bearing-rod which is engaged by the outer edge of the brim of a hat on the matrix.
4. In a machine of the character described the combination with a matrix and a shaft by which it is carried, of a cutter, a vertically-movable cutter-arm adapted to rest upon the top of the curl of a hat on the matrix, a bearing-rod and means for retaining the edge of the brim of a hat on the matrix in engagement with the bearing-rod.
5. In a machine of the character described the combination with a matrix, a shaft by which it is carried and an oval plate secured to said shaft with its long diameter at right angles to the long diameter of the matrix, of a cutter, an arm by which it is carried and which is adapted to rest upon the top of the

curl of a hat on the matrix, a bearing-rod and a spring engaging the oval plate and acting to retain the edge of the brim of a hat on the matrix in engagement with the bearing-rod.

5 6. In a machine of the character described the combination with a matrix, a shaft by which it is carried and an oval plate secured to said shaft with its long diameter at right angles to the long diameter of the matrix, of a
10 cutter, an arm by which it is carried and which is adapted to rest upon the top of a curl of a hat on the matrix, a bearing-rod, a spring engaging the oval plate, a rock-shaft by which it is carried and means for locking the rock-
15 shaft with the spring in operative position, whereby the pressure of the edge of a hat-brim on the bearing-rod is equalized and the action of the spring may be entirely relieved.

7. In a machine of the character described
20 the combination with a matrix, a shaft by which it is carried and a cutter, of an adjustable bearing-rod and means for retaining the edge of the brim of a hat on the matrix in engagement with said bearing-rod.

25 8. In a machine of the character described the combination with a matrix and a shaft by which it is carried, of a vertically-movable cutter-carrier having an arm to which the cutter is attached and which is adapted to rest on
30 the brim of a hat on the matrix, means for automatically moving the hat laterally relatively to the cutter, and a reciprocating cross-head which carries the cutter-carrier.

9. In a machine of the character described
35 the combination with a rotating hat-holder and means for retaining a hat thereon in position to be operated upon, of a reciprocating cross-head, a cutter and a carrier therefor which is vertically movable in the cross-head, and
40 means for automatically moving the hat laterally relatively to the cutter.

10. In a machine of the character described the combination with a cutter, framework having a slot 29 and a block adapted to move in
45 said slot, of a matrix, a universally-jointed shaft by which it is carried and which is journaled in said block and means for retaining a hat on the matrix in position to be operated upon.

50 11. In a machine of the character described the combination with a cutter, framework having a slot 29 and a block adapted to move in said slot, of a matrix, a universally-jointed shaft by which it is carried, said shaft being
55 journaled in the block and carrying an oval plate at right angles to the matrix, a bearing-rod and a spring engaging the oval plate whereby the edge of the brim of a hat on the matrix is retained in engagement with the
60 bearing-rod.

12. In a machine of the character described the combination with a matrix and a shaft by which it is carried, of a bearing-rod, means for retaining the edge of the brim of a hat on
65 the matrix in engagement with the bearing-

rod, a cutter, a cutter-arm therefor which is provided with a slot through which the bearing-rod passes and a vertically-movable cutter-carrier to which the cutter-arm is secured.

13. In a machine of the character described 70 the combination with a matrix and a shaft by which it is carried, of a bearing-rod, means for retaining the edge of the brim of a hat on the matrix in engagement with the bearing-rod, a cutter, a cutter-arm therefor which is provided with a slot through which the bearing-rod passes, a cutter-carrier to which the cutter-arm is secured and a cross-head having an opening and slot to receive the cutter-carrier and cutter-arm, so that the cutter-carrier may be
75 lifted and the cutter-arm raised above the bearing-rod and allowed to rest on the top of the cross-head to retain the cutter out of operative position.

14. In a machine of the character described 85 the combination with a hat-holder and means for retaining a hat thereon in position to be operated upon, of a reciprocating cross-head, a vertically-movable cutter carried thereby, means for automatically moving the hat laterally relatively to the cutter, and means for adjusting the throw of the cross-head when the sides of a brim are in position to be operated upon, whereby the width of the curl is determined. 95

15. In a machine of the character described the combination with a hat-holder and means for retaining a hat thereon in position to be operated upon, of a reciprocating cross-head, a vertically-movable cutter carried thereby, 100 means for automatically moving the hat laterally relatively to the cutter, and means for adjusting the throw of the cross-head when the quarters of a brim are in position to be operated upon, whereby the style of the curl is determined. 105

16. In a machine of the character described the combination with a hat-holder and a cutter, of a cross-head, an operating angle-lever pivoted thereto, a slide 56 on which the operating-lever has its fulcrum, said fulcrum shifting as the slide moves up and down, and a slide 51 with which the opposite end of the operating-lever has a sliding connection. 110

17. In a machine of the character described 115 the combination with a hat-holder and a cutter, of a cross-head, an operating angle-lever pivoted thereto, a slide 56 with which the operating-lever has sliding connection, said sliding connection serving as the fulcrum of the lever, a slide 51 and a block pivoted to said slide through which the rear end of the operating-lever passes. 120

18. In a machine of the character described the combination with a hat-holder and a cutter, 125 of a cross-head, an operating-lever pivoted thereto, a slide 56 on which the operating-lever has its fulcrum, said fulcrum varying with the movement of the slide, a slide 51 with which the opposite end of the lever has slid- 130

ing connection, a rotating disk, a strap inclosing said disk and an adjustable rod connecting said strap with slide 56 whereby said slide may be raised or lowered thereby varying the fulcrum of the operating-lever, changing the throw of the cross-head and determining the width of the curl of a hat-brim at the sides.

19. In a machine of the character described the combination with a hat-holder and a cutter, of a cross-head, an operating-lever pivoted thereto, a slide 56 on which the operating-lever has its fulcrum, said fulcrum varying with the movement of the slide, a slide 51 with which the opposite end of the lever has sliding connection, a rotating disk, means for adjusting said disk eccentrically and a strap and rod connecting said disk with slide 56, whereby said slide may be raised or lowered thereby varying the fulcrum of the operating-lever at the periods of time when the quarters of a hat-brim are in position to be acted on by the cutter.

20. In a machine of the character described the combination with a hat-holder and a cutter, of a cross-head, an operating-lever pivoted thereto, slides 51 and 56 with which the operating-lever has sliding connection, said slide 56 serving as the fulcrum of the lever and said fulcrum shifting with the movements of the slide and means for adjusting said slide without shifting of the fulcrum when it is desired to change the width of a curl at the sides without change at the quarters.

21. In a machine of the character described the combination with a hat-holder and a cutter, of a cross-head, an operating-lever pivoted thereto, slides 51 and 56 with which the operating-lever has sliding connection, said slide 56 serving as a fulcrum for the lever and said fulcrum shifting with the movements of the slide and means for adjusting the movements of the slide, whereby the fulcrum of the operating-lever is shifted and the throw of the cross-head regulated when the quarters of a hat-brim are in position to be operated upon.

22. In a machine of the character described the combination with a hat-holder and a cutter, of a cross-head, an operating-lever pivoted thereto, slides 51 and 56 with which the operating-lever has sliding connection, said slide 56 serving as a fulcrum for the lever and said fulcrum shifting with the movements of the slide, shaft 12, a disk on said shaft, means for adjusting said disk eccentrically thereto in either direction and a strap and rod connecting said disk with slide 56, whereby said slide may be caused to move either with or in reverse to slide 51 thereby varying the position of the fulcrum, substantially as shown, for the purpose specified.

23. In a machine of the character described the combination with a hat-holder and a cutter, of a cross-head, an operating-lever pivoted thereto, slides 51 and 56 with which the op-

erating-lever has sliding connection, said slide 56 serving as a variable fulcrum for the lever, a shaft, a hub on said shaft having flattened sides, a disk having a slot engaging the flattened sides of the hub and a scale, a plate on the hub having a point adapted to register with the graduations of the scale, means for locking the disk at any desired eccentricity to the shaft and a strap and rod connecting the disk with slide 56 whereby the fulcrum of the operating-lever may be varied to change the throw of the cross-head in accordance with the scale on the disk.

24. In a machine of the character described the combination with framework having a scale 73, a hat-holder and a cutter, of a cross-head having a point adapted to register with the scale to determine width of curl, an operating-lever pivoted to the cross-head, slides 51 and 56 with which the operating-lever has sliding connection, said slide 56 serving as a variable fulcrum for the operating-lever and means for adjusting the throw of slide 56 and consequently of the cross-head in accordance with the scale.

25. In a machine of the character described the combination with a hat-holder and a reciprocating cross-head, of a cutter, a cutter-arm to which it is secured, a cutter-carrier vertically movable in the cross-head to which the cutter-arm is secured, and means for automatically moving the hat laterally relatively to the cutter.

26. In a machine of the character described the combination with a hat-holder and a reciprocating cross-head, of a cutter, a spring by which it is carried, a cutter-arm to which the spring is attached and a cutter-carrier vertically movable in the cross-head to which the cutter-arm is secured.

27. In a machine of the character described the combination with a hat-holder, a reciprocating cross-head and a bearing-rod, of a cutter, a spring by which it is carried, a cutter-arm to which the spring is attached, said cutter-arm and spring being slotted to permit the bearing-rod to pass therethrough and a cutter-carrier vertically movable in the cross-head to which the cutter-arm is secured.

28. In a machine of the character described the combination with a hat-holder and a cutter, of a cross-head, an operating angle-lever pivoted thereto, slides 51 and 56, blocks pivoted to said slides through which the operating-lever slides freely, said slide 56 serving as a variable fulcrum for the lever, a shaft, a disk eccentrically adjustable thereon and a strap and rod connecting said disk with slide 56, the parts being so combined and arranged that when the eccentric is adjusted in one direction said slides will move upward simultaneously and when the disk is adjusted in the opposite direction slide 56, which is the fulcrum of the operating-lever, will move downward when slide 51 is moving upward.

29. In a machine of the character described the combination with a hat-holder and a cutter, of a cross-head, an operating-lever pivoted thereto, slides 51 and 56 with which the operating-lever has sliding connection, said slide 56 serving as a variable fulcrum for the lever, a shaft having a crank by which slide 51 is operated and a disk eccentrically adjustable thereon and connections by which slide 56 is operated, the parts being so combined and arranged that when the disk is adjusted in the direction of the crank, the slides will move upward together thereby varying the fulcrum of the operating-lever and the throw of the cross-head to produce fuller quarters, and when the disk is adjusted in the opposite direction slide 56 will move downward as slide 51 moves upward thereby varying the fulcrum of the operating-lever and the throw of the cross-head to produce narrower quarters.

30. In a machine of the character described the combination with a hat-holder and a cutter, of a cross-head, an operating-lever pivoted thereto, slides 51 and 56 with which the operating-lever has sliding connection, said slide 56 serving as a variable fulcrum for the lever, a shaft, a disk carried thereby, means for adjusting said disk on the shaft and a strap and adjustable rod connecting said disk with slide 56, adjustment of said disk on the shaft acting to vary the fulcrum of the operating-le-

ver in use and consequently the throw of the cross-head, whereby the quarters of a curl may be made fuller or narrower without change of width at the sides and adjustment of the connecting-rod acting to raise or lower the fulcrum of the operating-lever but without variation in use whereby the sides of a curl may be made wider or narrower without change at the quarters.

31. In a machine of the character described the combination with a hat-holder and a cutter, of a cross-head, an operating-lever pivoted thereto, slides 51 and 56 with which the operating-lever has sliding connection, said slide 56 serving as a variable fulcrum for the lever, a shaft having a crank and connection by which slide 51 is operated and a disk eccentrically adjustable thereon and a strap and adjustable connecting-rod by which slide 56 is operated, whereby the fulcrum of the operating-lever may be adjusted to produce a curl having wider or narrower sides or wider or narrower quarters or both sides and quarters may be varied simultaneously.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK C. CRAW.

Witnesses:

A. M. WOOSTER,
S. W. ATHERTON.