

No. 897,033.

PATENTED AUG. 25, 1908.

S. B. TOMPKINS.

SHANK CUTTING, MOLDING, SKIVING, AND FORMING MACHINE.

APPLICATION FILED AUG. 7, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

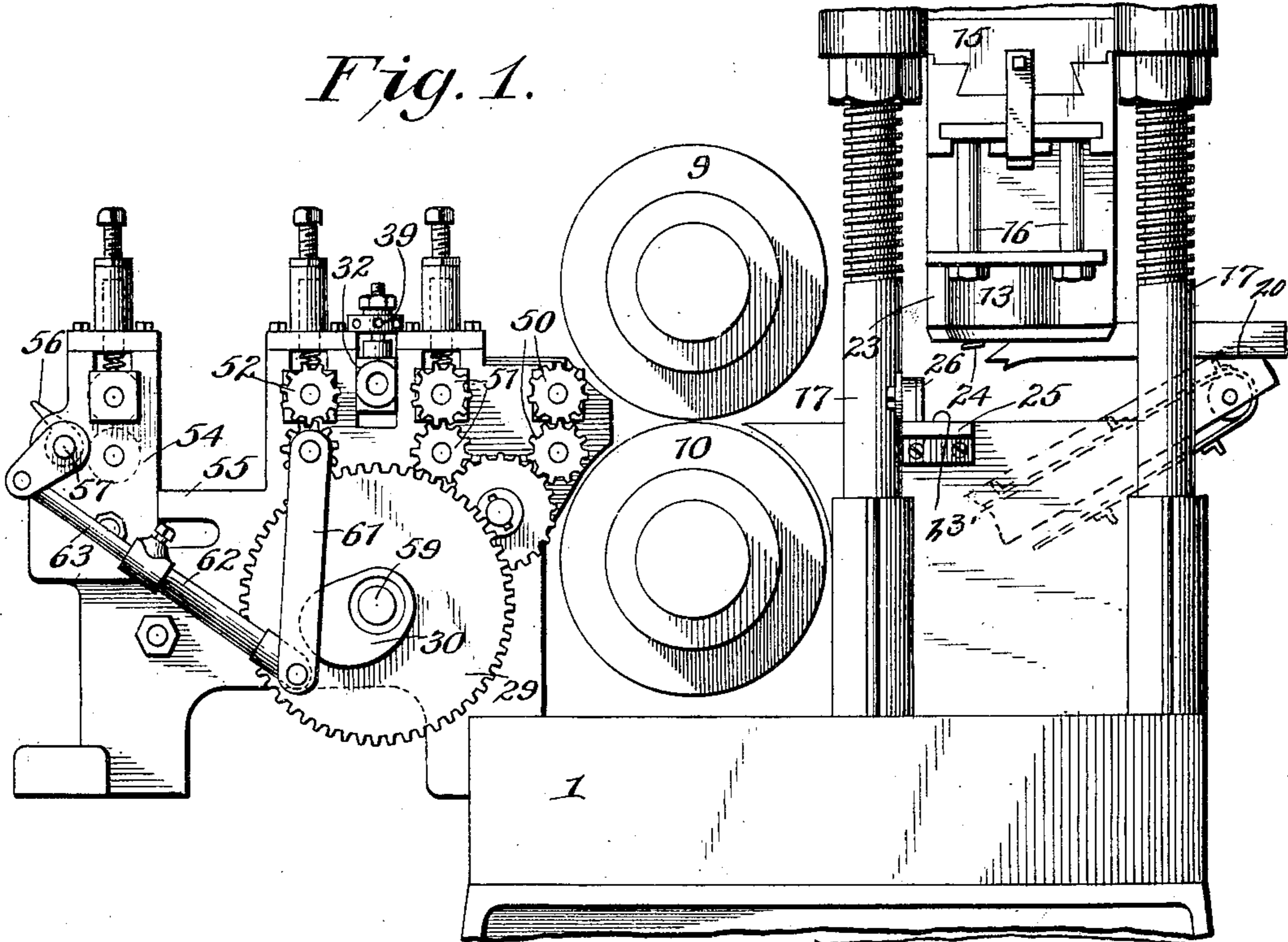
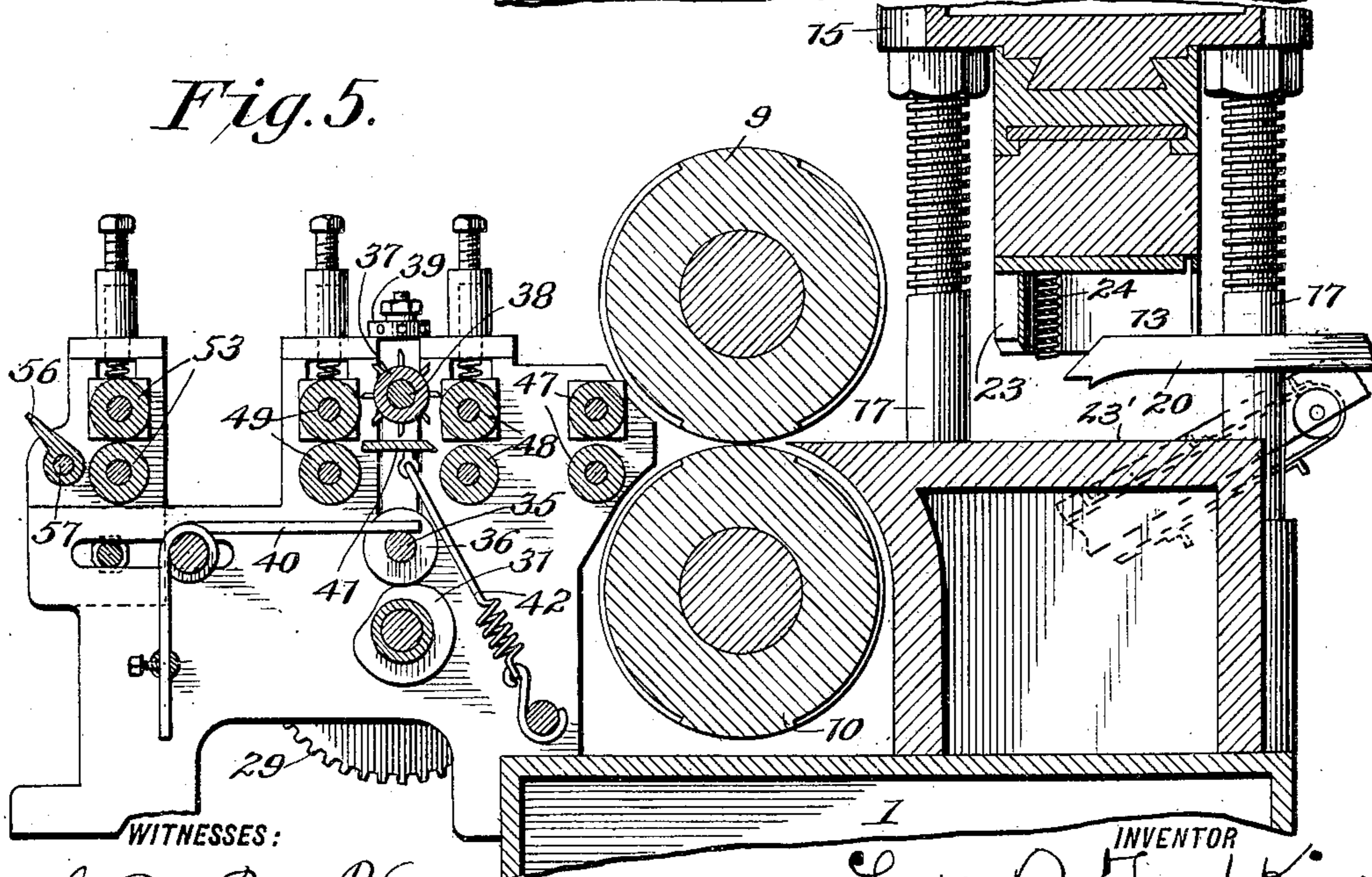


Fig. 5.



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3 SHEETS—SHEET 2.

Fig. 3.

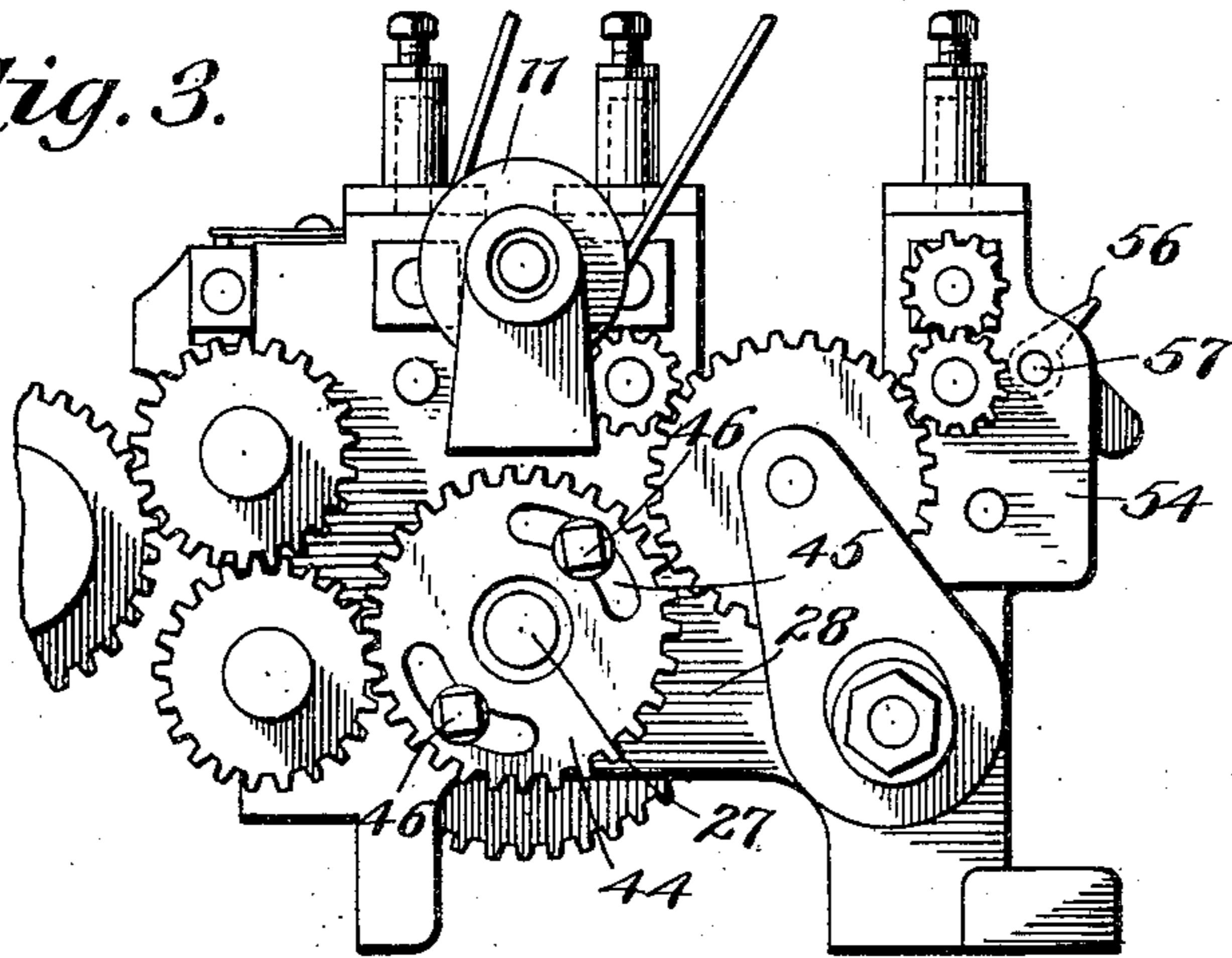


Fig. 2.

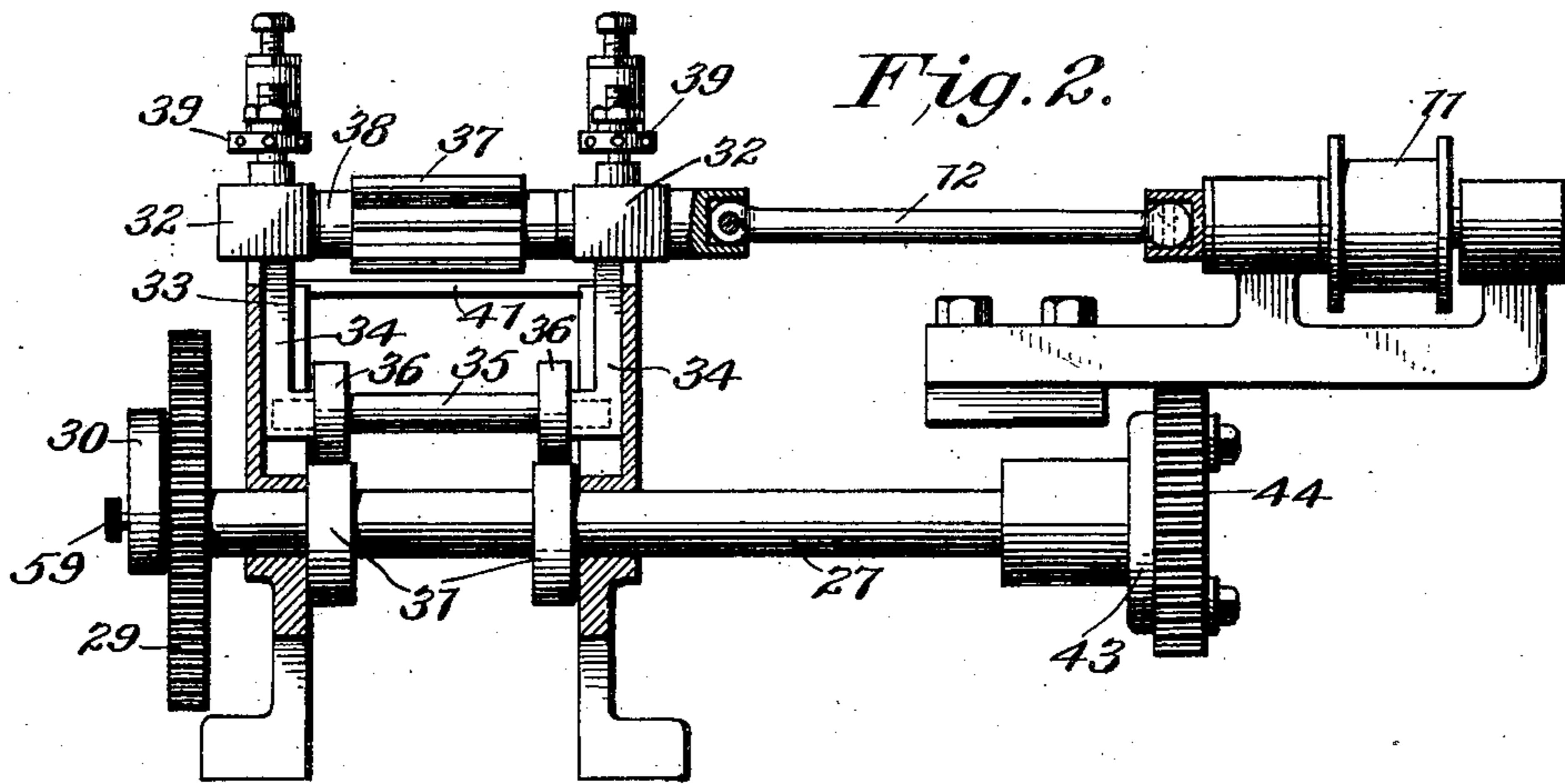


Fig. 4.

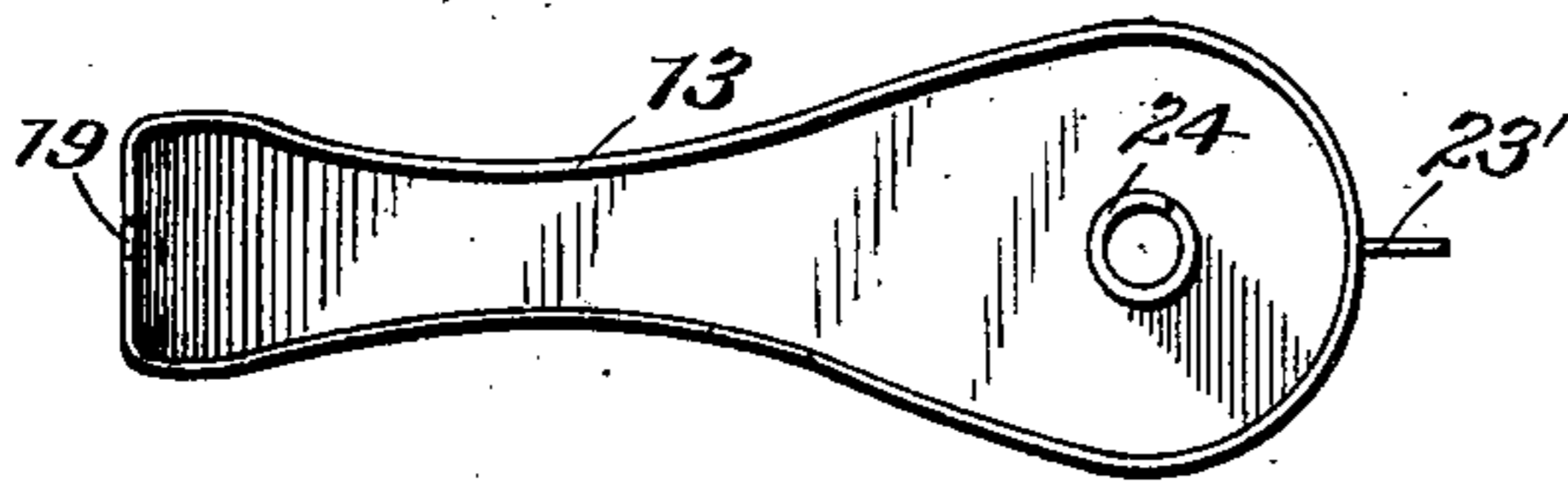
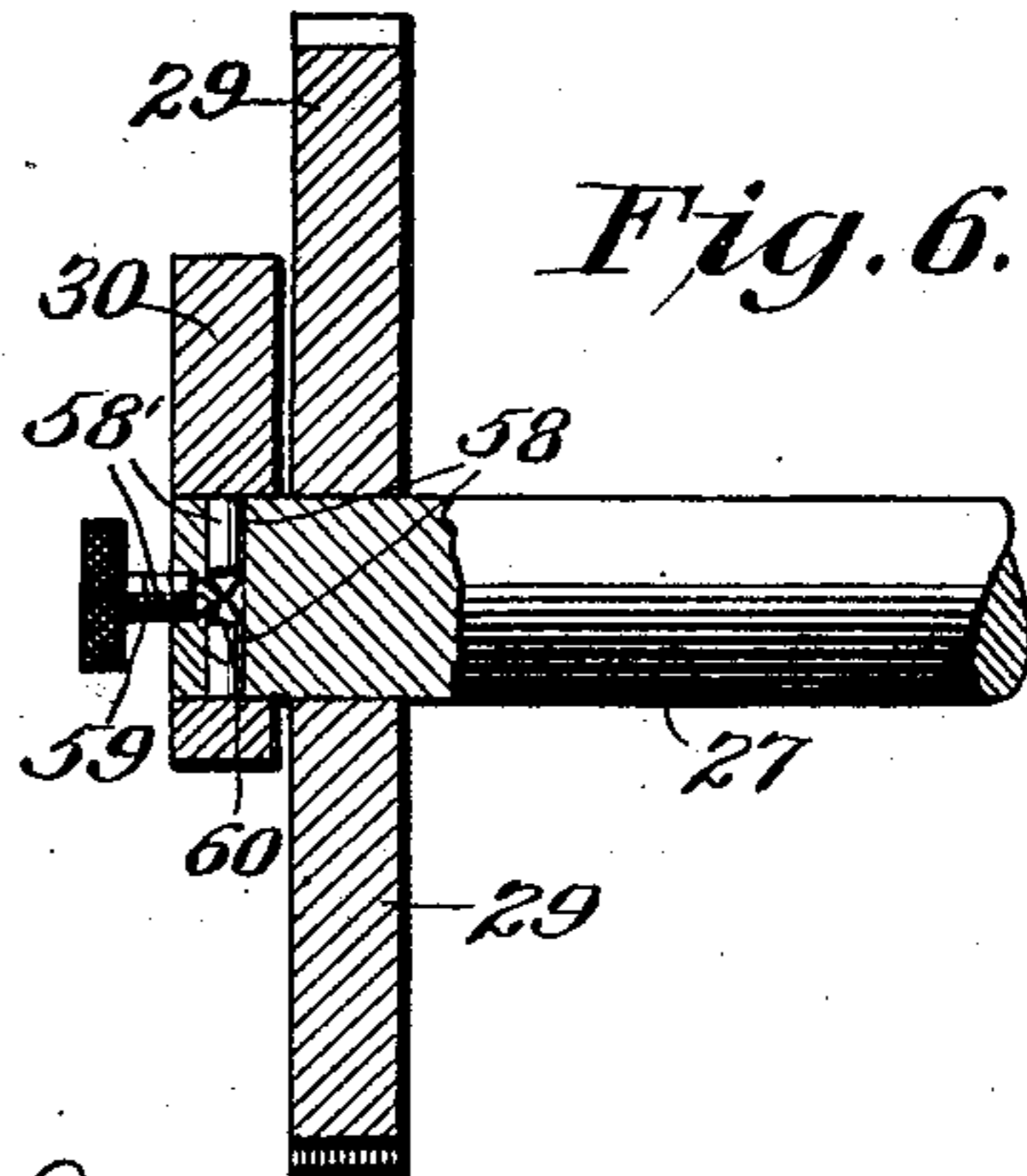


Fig. 6.



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3 SHEETS—SHEET 3.

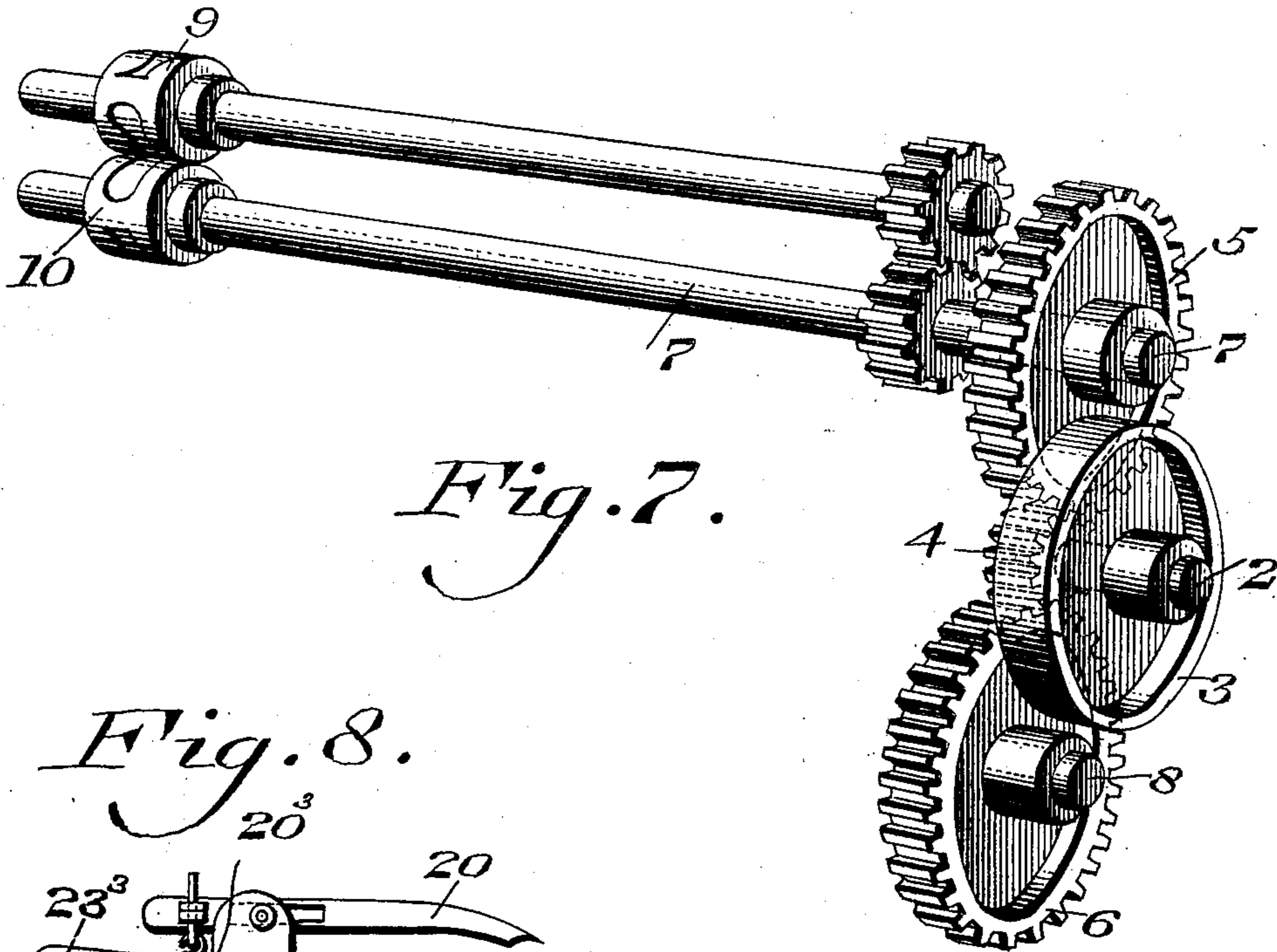


Fig. 7.

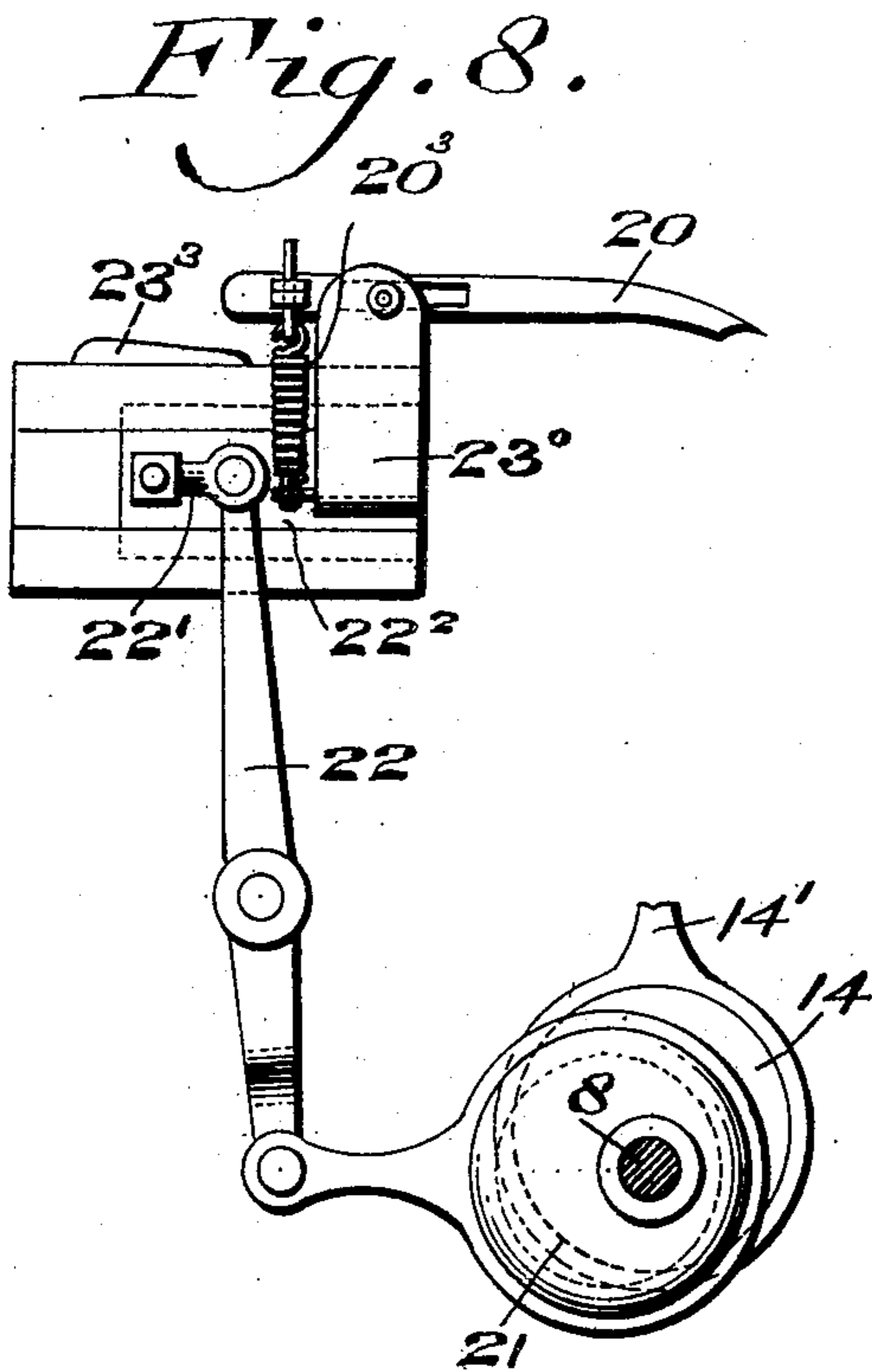


Fig. 8.

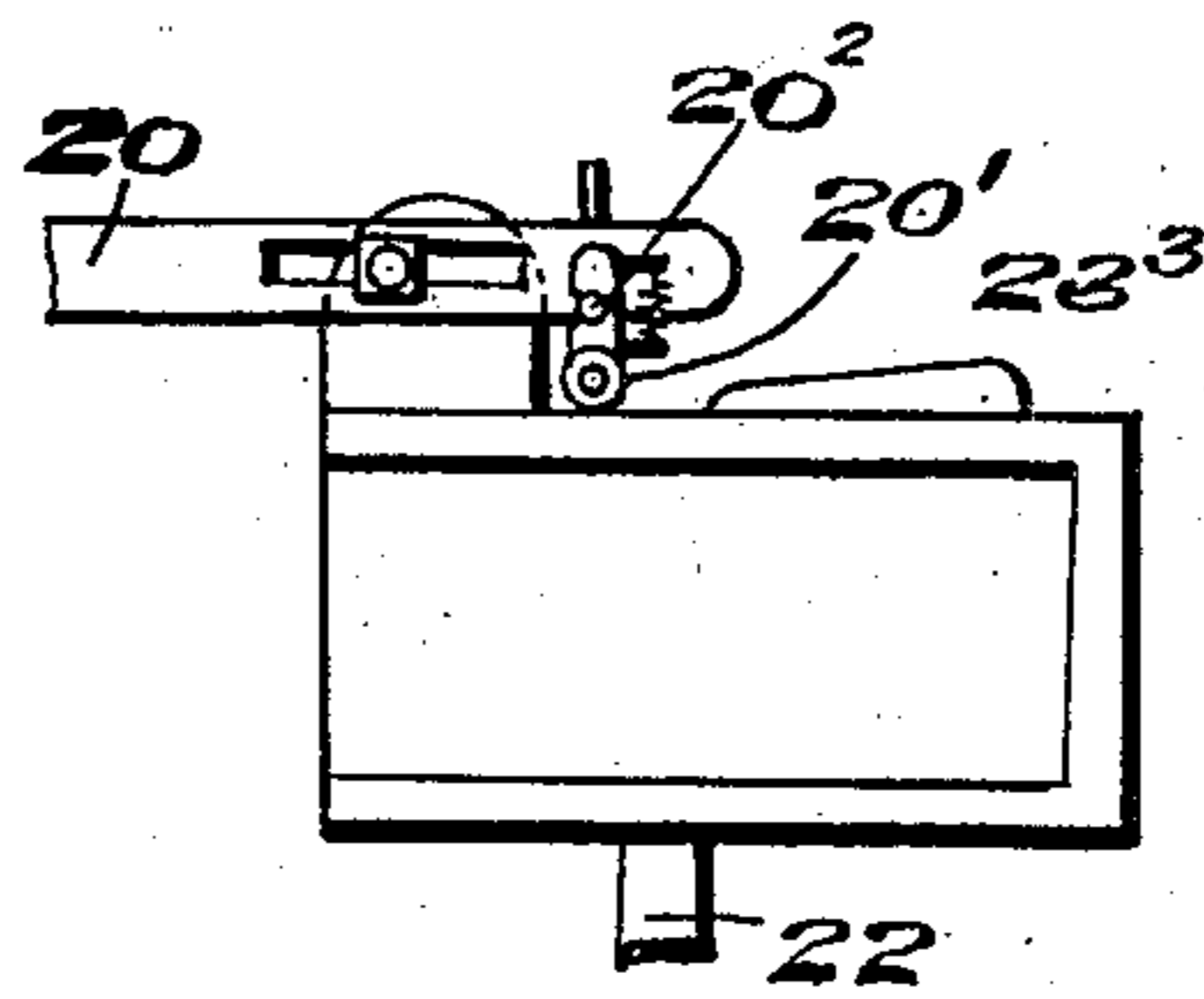


Fig. 9.

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UNITED STATES PATENT OFFICE.

SCOTT B. TOMPKINS, OF ROCHESTER, NEW YORK.

SHANK CUTTING, MOLDING, SKIVING, AND FORMING MACHINE.

No. 897,033.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed August 7, 1906. Serial No. 329,520.

To all whom it may concern:

Be it known that I, SCOTT B. TOMPKINS, a citizen of the United States, residing at Rochester, county of Monroe, State of New York, have invented a novel construction of Shank Cutting, Molding, Skiving, and Forming Machine, of which the following is a specification.

In shanks that are ordinarily constructed, the front end of the shank is skived by a separate operation transversely, requiring the insertion in a separate machine and independent action.

In my novel construction, I cut the shank in a new way, saving in material and in handling of the same and insuring a full back or rear end to the said shank.

The purpose of my invention is to permit a continuous operation by cutting and forming and to skive without the removal from the machine.

A further purpose of my invention is to automatically feed the shank to the forming apparatus after it has been cut.

A further purpose of my invention is to release the shank from the cutting die to permit this feeding.

A further purpose of my invention is to separate the remnants of material remaining after cutting the shank to facilitate its removal.

A further purpose of my invention is to feed the shank directly to a skiving machine.

A further purpose of my invention is to skive the shank longitudinally thereon.

A further purpose of my invention is to adjust the amount of skiving as well as the point at which it occurs.

A further purpose of my invention is to provide an adjustable former by which the shank is given any desired curvature.

Shanks are ordinarily provided with a metallic stiffening means and my invention is intended to apply to shanks of this or any desired character, but does not in any way relate to the stiffening means used.

Figure 1 represents a side elevation of a machine provided with my invention. Fig. 2 represents a rear end elevation of part of the same. Fig. 3 represents a reverse side elevation of a portion of Fig. 1. Fig. 4 represents a bottom plan view of the cutting die, of which I make use. Fig. 5 represents a longitudinal and vertical section of my skiving and forming mechanism, showing also a

molding die which is not new with me. Fig. 6 represents a section of my cam retaining mechanism. Fig. 7 is a perspective view of a portion of the transmission gearing. Figs. 8 and 9 represent, in section and side elevation, my mechanism for giving depression to the arm 20.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings: 1 designates a frame on which is supported a main driving shaft 2 carrying pulley 3 and spur gear 4, which latter in the form illustrated engages two gears 5 and 6 upon shafts 7 and 8 respectively, these shafts being properly housed within the frame. The upper shaft 7 operates the molding dies 9 and 10 all as is well known in the art. It also operates the entire skiving and forming mechanism except the skiving cutter itself, which in the form shown is operated by a separate belt and pulley 11 through shaft 12.

It will be evident that any of the parts of the machine might be independently operated, provided the relation between some of their rotations be maintained, and that the skiving cutters could be operated from the main shaft through any suitable speed mechanism, or that other arrangement of distributing the power within the machine might be made use of without departing from my invention.

The lower shaft 8, operates the cutting die 13 by which the material of the shank is separated from the material of the piece to be cut, by means of eccentric 14, within strap 14', lifting and lowering head 15, to which the die is secured by means of bolts 16. The connection between the eccentric strap and the head is made by means of bolts 17, so that this head rises and falls preferably nearly vertically to permit the insertion of the blank and the withdrawal of the same.

The main part of the cutting die constitutes a nearly continuous surface for cutting, which is continuous as to the rear end of the shank, but which has an aperture at the front portion thereof at 19, and the cut blank is forwardly pushed by means of feed arm 20 operating through this aperture.

The feed arm 20 is moved by an eccentric 21 upon the shaft 8 through rocker arm 22 through a link 22', block 22², and post 23⁰, acting upon the pivoted arm to which is secured a roller 20' by a post knuckled at 20²

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traveling over such a path or guide at 23³, as results in a depression of the feed arm at a point in its motion toward the front end of the shank, so that this arm engages the cut
 5 blank and pushes it into the molding rolls 9 and 10, the operation being so timed as to have the blank coincide with the proper de-
 10 pressions or dies in these rollers 9 and 10. The refuse left from each cutting is with-
 10 drawn at the side by any suitable rake, sorter or carrier.

As it is necessary to have the shank complete at the rounded or rear end, provision must be made to prevent the cutting die
 15 from passing or even extending clear to the edge of the blank of material, so that it may always cut in good material at this point. In order to sever the material cut at this
 20 point, I provide an additional or auxiliary cutting die 23 at the middle preferably and beyond the rounded end of the cutting die and moving therewith. The plate or die
 against which these two dies cut I term a co-
 25 operating die which I designate 23'.

In order that the cut blank may be fed surely and properly by the feed arm without sticking within the cutting die, I provide a
 30 spring 24 inside the cutting die at the end nearest to the molding dies or rolls, which spring is overcome during the cutting operation, the movement of the cutting die com-
 35 pressing such spring, but so located that the upward movement of the cutting die will release the spring, which then forces the cut
 40 blank out of the die at this point, that is, at the end adjacent molding rollers, which as has already been stated is the rear end of the
 45 turn shaft. The particular mechanism of the sorter by which the refuse material from the cutting is withdrawn and removed after
 50 it has been separated does not constitute a part of my invention; any suitable conveyer may be used. The operation of this portion
 55 of the mechanism is as follows:—A blank, from the width of which the length of the shank is to be cut is fed into the machine
 60 from the side away from the driving pulley over bed 25 and against guide 26. The die comes down and cuts the shank from the
 65 blank, at the same time, by means of the auxiliary or supplemental cutting die, separating the waste from the body of the blank. During the downward movement of the cut-
 65 ting die, the spring 24 first makes contact with the blank and holds it firmly during the compression of the spring and the operation
 of the cutting die. The cutting die then moves upwardly out of the way, and the spring 24 releases and is finally lifted away
 from the cut blank but not before it has pressed the rear end of the shank out of the cutting die. The feed arm then moves for-
 wardly and downwardly toward the molding rolls, engages with the blank which has been
 cut and pushes it into the molding rolls, this

action registering with the revolution of the molding die depression upon the surface of the molding roll.

Since the front end of the shank need not be finished with such exactitude, the outer
 70 limiting side edge of the original blank may constitute this end, to be skived as hereaf-
 75 ter stated, and the cutting die can be made to extend beyond this edge of the blank so that the transverse apertured end of the cut-
 75 ting die ordinarily does little or no cutting and the presence of the aperture at this point is not injurious.

Skiving.—The molding rollers at the same time act as feed rollers for the next operation
 80 and press the shank into the skiving mechanism. The molding to which reference is here made is ordinarily confined almost exclu-
 85 sively to the compression of the edges of the neck or intermediate portion of the shank, but may include any press work that may be desired.

The upper shaft 7 in the form shown is provided with gearing for the suitable driv-
 90 ing of the molding rollers, and in addition is geared to a shaft 27 suitably supported in a frame 28, and carrying gear 29, and cam 30, for a purpose to be hereinafter described. Intermediate parts of the frame for conven-
 95 ience, upon this same shaft 27, I have located cams 31, which I make two in number in order readily to give sure and uniform up-
 100 ward movement to the boxes 32, which guide the skiving frame 33. In the particular form shown, this frame consists of side
 105 members 34 having bearings for two shafts therein, the lower shaft 35, carrying rollers 36, for engagement with the cam 31 and the upper shaft carrying the skiving cutter 37. The upper shaft 38 is preferably driven from
 105 the independently operated shaft previously mentioned by an intermediate universal or flexible coupling or shaft.

Upon the top of each frame member I provide nuts each protected by a lock nut for the
 110 purpose of regulating the extent of depression of the skiving cutter by reason of the spring action to be hereinafter described. These nuts 39 engage with any convenient
 115 adjacent fixed member, in the form shown with the top of housings or other bearings, and limit the downward movement of the skiving frame and hence of the skiving roller.

The skiving frame is run downwardly by any suitable means. In the form illustrated
 120 I have used a spring 40 but any other suitable means or different spring may be used.

It will be evident that the skiving frame is moved upwardly by the cams with which its
 125 lower rollers engage and is kept tight against these cams or in its lowermost permissible position resulting from the adjustment mentioned, by means of this spring or such other suitable means. The blank is passed be-
 130 tween the skiving roller and the bed plate 41,

which plate is preferably removable for convenience and is held in its operative position by any suitable means, in the form shown by means of a spring 42. Each of the springs mentioned is connected at one end to the

part to be retained and at the other end to any convenient fixed member.
 It will be evident that the skiving frame and hence also the skiving cutter is moved upwardly by means of the cams and is drawn back to place by the spring but this may be reversed and the downward movement caused by positive means, the upward movement being spring controlled or both movements may be by positive means, such as cams, cranks or eccentrics. This upward and downward movement of the skiving roller brings it further away from or nearer to the bed or plate over which the blank is made to pass and is timed so that one complete double movement (that is a reciprocation) occurs for each cutting of a blank and hence for each molding of a blank. The timing of the movement of the cam is arranged by means of a plate attached to the shaft by which these cams are driven abutting against the gear operating said shaft, face to face, and by a bolt or stud passing through a circumferential slot in the gear, and into said plate, it being evident that the bolt or stud can be tightened in any relative angular positions of the gear and the plate.

The plate 43, gear 44, slot 45 and stud 46 may be substituted by other suitable means of angular adjustment.

The blank, as it leaves the molding rolls, is fed into feed rollers 47, 48 and 49, arranged in pairs and driven by studs, 50, 51 and 52 respectively, so as to cause a continuous movement of the shank over the bed plate beneath the skiving cutter. It will be evident that other mechanism might be provided or that a different number and relation of rollers might be used. In the movement of the shank to these rollers, the front portion of the shank, which is the portion to be skived, is the last portion to pass through beneath the skiving cutters and the mechanism is so timed that the skiving cutter does not act until a predetermined point just before the molded blank has been passed entirely through the space beneath the skiving cutter.

It will be evident that the skiving takes place longitudinally of the shank and as a continuous operation in the treatment of the same.

It will be evident that any other form of skiving cutter or driving means therefor may be used or that other timing and adjusting mechanism may be used and that other operation and release from operation of the skiving cutter upon the molded blank than that illustrated by me may be used. It will be also evident that the skiving may take place either before or after the molding of

the shank without interfering with the operation of my invention.

In all of the feeding rolls which I employ, I preferably mount one of each pair of rolls in movable boxes or bearings within the housings and provide spring pressure in order that the rolls may follow up the blank to exert a nearly uniform pressure thereon. The exact form of these is not a part of my invention.

It will be evident that the cutting, feeding and skiving are applicable to any form of shank whether it be "formed" or not.

Forming.—Upon the farther side of my skiving mechanism from the molding rolls, I illustrate a forming mechanism in line with the feed rollers of my skiving mechanism and comprising a pair of feed rollers and a plate former. These feed rollers 53 are preferably at a fixed distance from the "former," although some of the advantages of my invention may be obtained without maintaining this fixed distance.

If the mechanism is to be used at all times upon the same size and shape of shank, the feed rollers and former may also be placed at a fixed distance from the skiving mechanism and from its terminal feed rollers, but to accommodate for different sizes and shapes, I make this distance adjustable, arranging preferably both the feed rollers and former in a frame or housing, which is arranged to slide toward and away from the skiving mechanism. This housing 54 is movable upon guides 55 and carries with it the rollers 53 and former 56. The rollers perform the usual function of such devices and are placed near enough to the feed mechanism of the skiver so that during the earlier part at least of the action of the "former" the shank is engaged by both sets of feeding mechanism. This is not, however, essential.

The former 56 is mounted upon a rock shaft 57 and is in its preferred form a plate off center or eccentric to said shaft. The rock shaft is operated by means of cam 30 on shaft 27, said cam 30 being adjustable upon said shaft, as follows:—The shaft at this point is provided with preferably radial openings 58 within which slide cam-engaging pins 58' having at their outer ends, that is, toward the end of the shaft 58, preferably rounded or tapered surfaces in proximity to each other, that is, an opening preferably having tapered boundary walls is formed near the center of the shaft between these two sliding pins. The end of the shaft is tapped or otherwise provided with means for causing longitudinal movement of a rod 59, whose tapered end 60 spreads the radial sliding pins when it is moved inwardly and permits them to release when removed outwardly. This rod is preferably in the form of a screw. The cam 30 surrounds the shaft 27 and is engaged by the ends of the sliding

pins most remote from each other. This cam 30 operates the rock shaft 57 once for each blank cut and formed and the time of such operation is adjustable by adjustment of the cam 30. Any suitable means of connection between the cam and rock shaft may be used and it will be evident that a crank or eccentric and other means for giving angular movement to the "former" and its shaft 57 might be used without losing all the benefit of my invention. The exact form of connection which I use is by means of a hanging arm 61, which I pivot for convenience upon the end of one of the guide roller shafts, which arm carries a telescopic rod construction consisting of outer member 62 and inner member 63, one end being connected to the arm 61 and the other end to the crank of the rock shaft. A roller may reduce the friction between the cam and the operated parts.

The telescopic connection between the cam and rock shaft permits adjustment of the angular position of the path of movement of the "former"; although the amount of movement remains substantially the same, the ultimate height may be varied.

It will be evident that the former can be adjusted to operate upon any length of shank, at any time during the passage of the same and to any extent that may be desired, giving complete control of the extent and character of curvature given to the shank without the necessity of separate pressing or bending of the same.

It will be evident that any means of driving any part of my mechanism or of timing or determining the amount or extent of operation thereof may be used while still obtaining part of the benefit of my invention and that a different order of operation or different mechanism or use of same may be used without losing all benefit therefrom.

I claim the benefit of a considerable range of equivalents in the structures which may be made to carry out the function which I have set forth.

Claims.

1. In a device of the character described, a cutting die continuously curved at one end thereof, and open at the other end thereof, a spring operating within the closed end of the die, and normally projecting therebeyond in the direction of movement of the cutting die, feeding mechanism for the material cut operating within the die, and means for operating said cutting die.

2. In a device of the character described, a cutting die continuous at one end thereof and apertured at the other end thereof, means for releasing the material cut, means for operating the cutting die, feeding mechanism for removing the material cut, operating through the open end of said die, and a die cooperating with said cutting die.

3. In a device of the character described, feed rolls, a skiver, a former, means for varying the distance between the former and the skiver, and means for operating the feed rollers, skiver and former.

4. In a device of the character described, a molding die, a skiver, means for adjusting the time of action of the skiver, and feed rolls between the die and skiver.

5. In a device of the character described, a former and an angularly adjustable cam for operating the same, and means for varying the extent of movement of said former.

6. In a device of the character described, a cutting die, molding rolls, a skiver, feeding mechanism between these devices and means for lifting the skiver in an approximate straight vertical line.

7. In a device of the character described, a cutting die, a molding device, a skiver, guides for controlling the vertical movement of said skiver, means for moving the skiver vertically and feed mechanism between the several devices.

8. In a device of the character described, a skiver, a forming device, means for varying the distance between the skiver and forming device and feeding mechanism between said skiver and forming device.

9. In a device of the character described, a vertically movable skiver, a rocking former and means for varying the movement of said former.

10. In a device of the character described, a skiver, a former, means for varying the time of action of said former with reference to the action of the skiver.

11. In a device of the character described, a skiver, a movable former, and means for varying the location of the path of movement of said former.

12. In a device of the character described, a skiver, a movable former, means for varying the distance between the skiver and said former, and means for varying the position of the path of movement of said former.

13. In a device of the character described, a skiver, a rocking former, a cam for rocking said former and connections between the cam and former, whereby the location of the path of movement of the said former may be varied.

14. In a device of the character described, a skiver, a frame supporting the same, means for moving the skiver vertically in said frame, a former, a movable former support, means for securing said support in varied position with respect to said skiver and means for moving said former.

15. In a device of the character described, a rotary skiver, a work support beneath said skiver, means for varying the distance between said skiver and work support, feed rollers, a former, and means for varying the

position of said former with respect to said skiver.

5 16. In a device of the character described, a shaft, a cam loose thereon, pins radially movable with respect to said shaft and within the cam, a wedge operating between said pins at their inner ends and means for moving said wedge between said pins to cause the pins to engage said cam in adjustable position.

10 17. In a device of the character described, a cutting die, molding dies, a skiver vertically movable in time with the action of said molding dies and means for varying the time dur-

ing the action of the molding dies at which said vertical movement takes place. 15

18. In a device of the character described, molding dies, a vertically movable rotary skiver, means for effecting the vertical movement one reciprocation for every action of the molding dies and means for varying the 20 time of said vertical movement.

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