

No. 675,743.

Patented June 4, 1901.

J. LANZ.
METAL SHEARING MACHINE.

(No Model.)

(Application filed July 9, 1900.)

5 Sheets—Sheet 1.

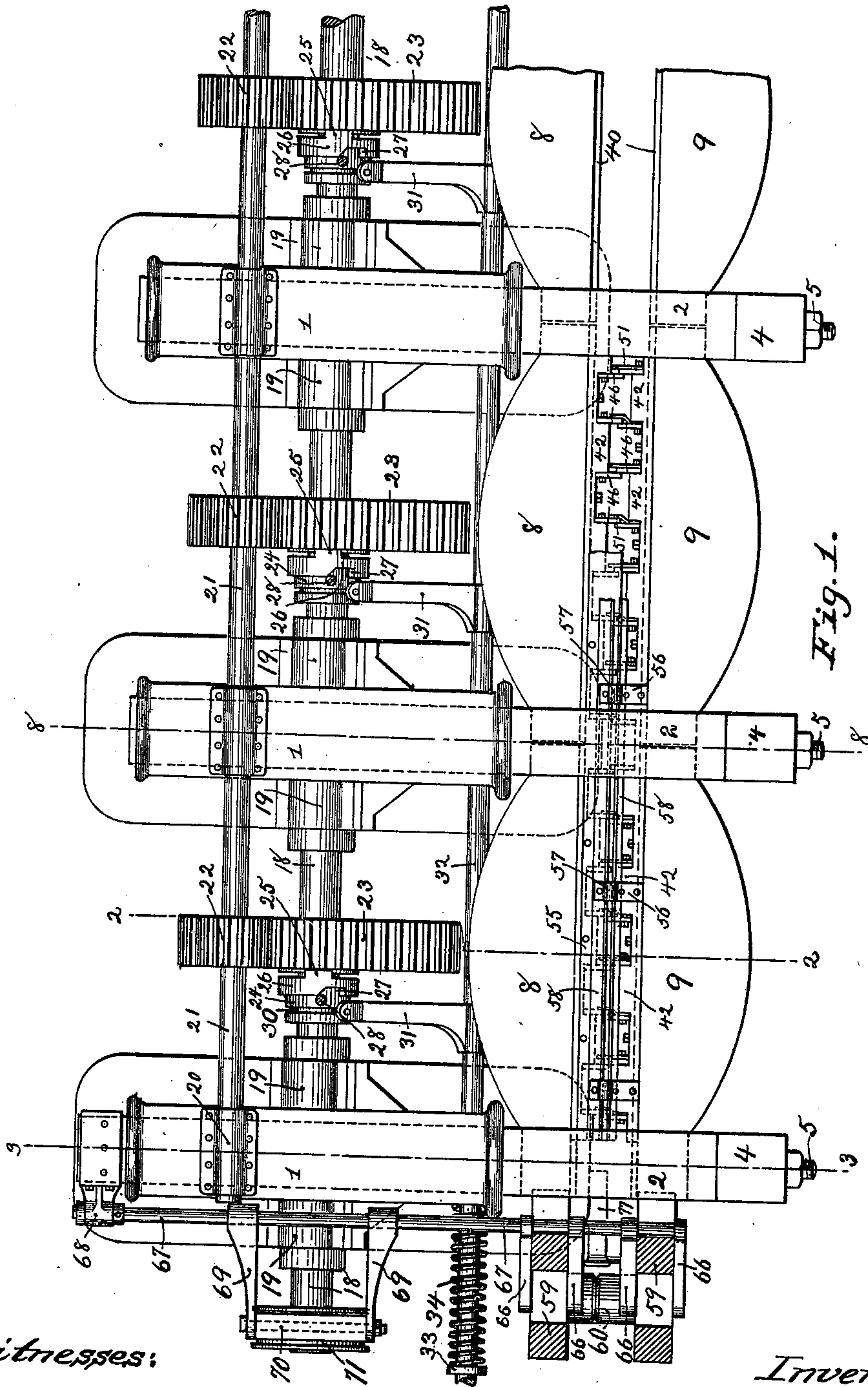


Fig. 1.

Witnesses:
Walter Samaras
Allan H. Thoe

Inventor:
John Lanz
By Kay & Lotte
Attorneys.

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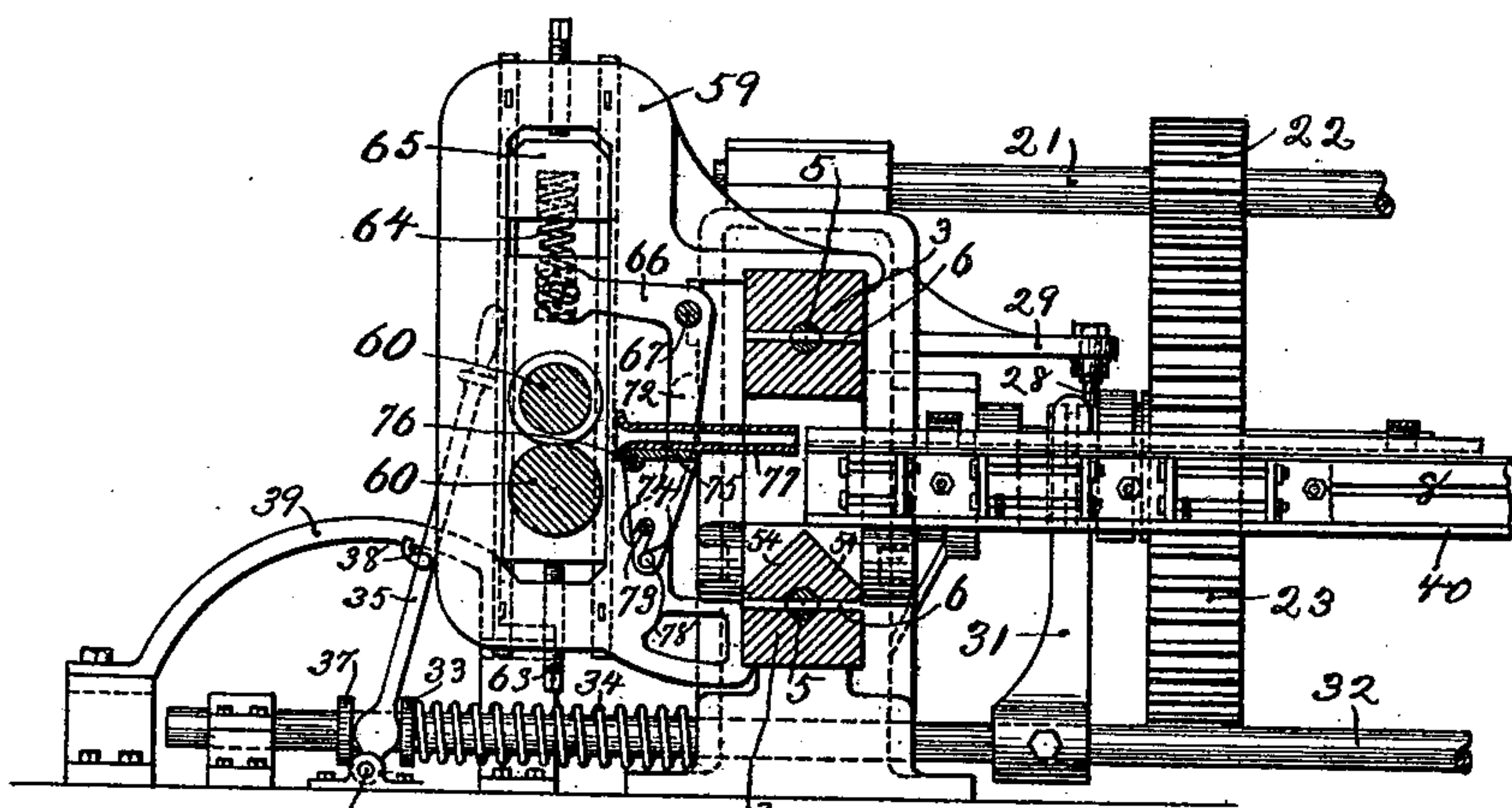
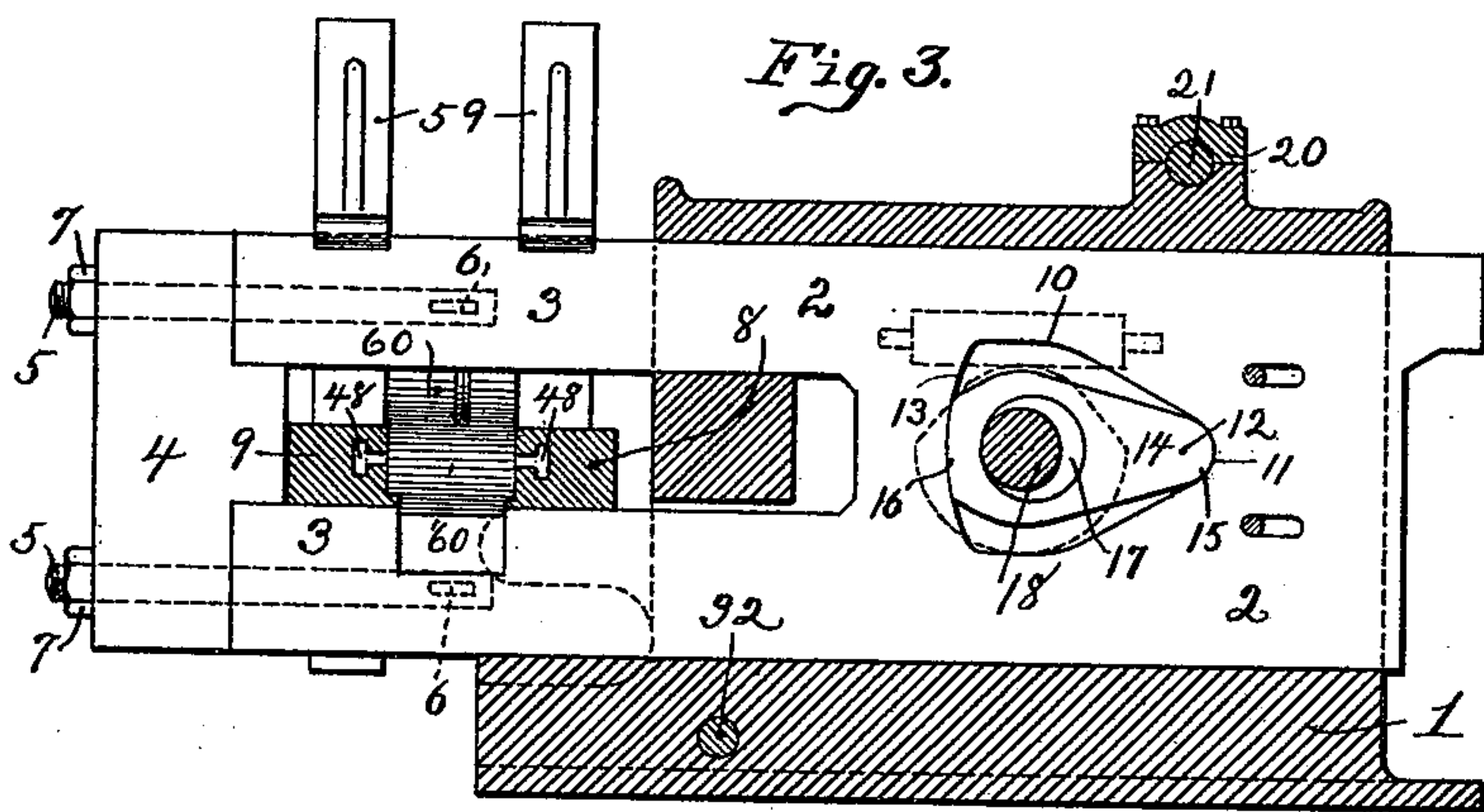
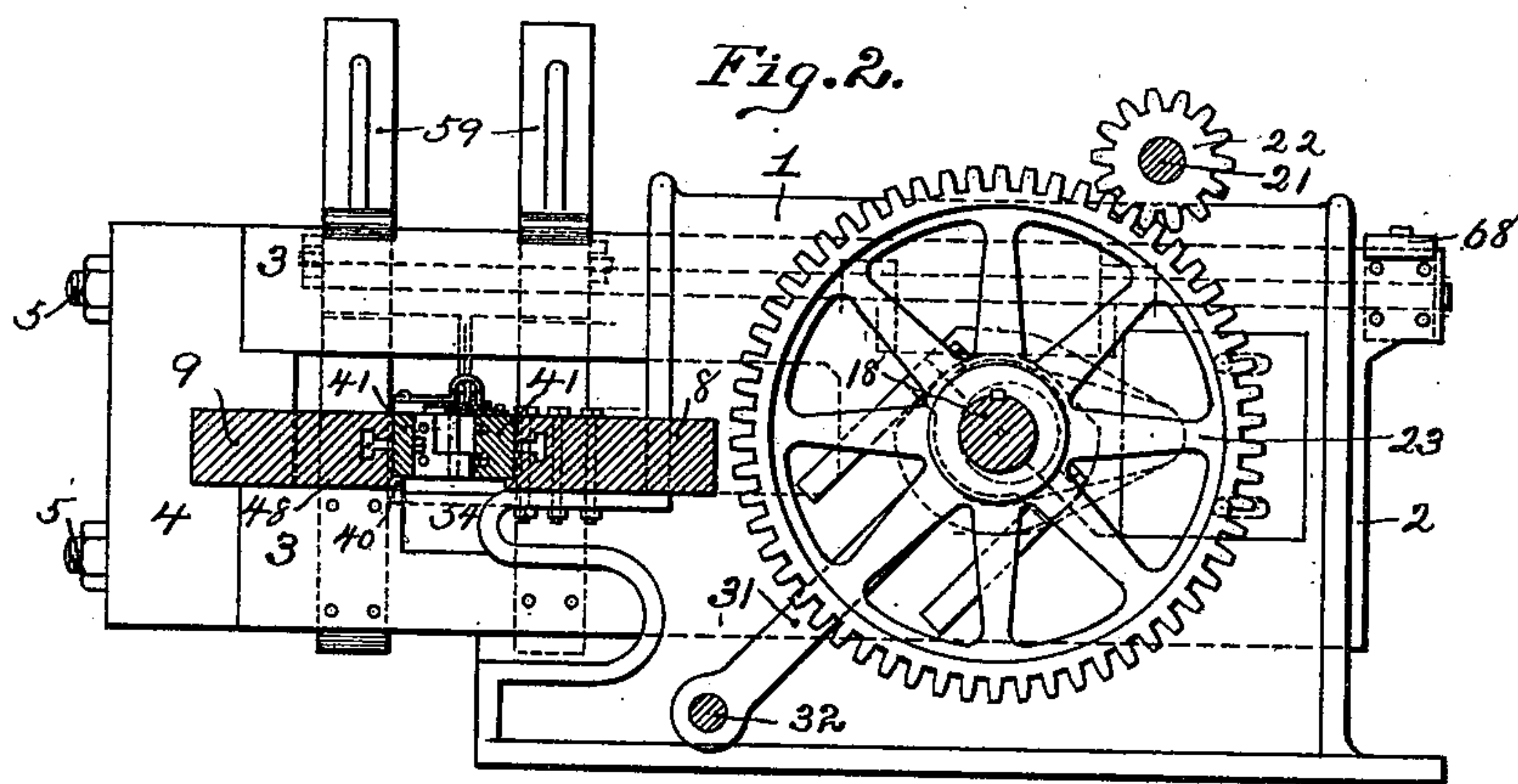
J. LANZ.

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5 Sheets—Sheet 2.



Witnesses:

Walter Samaris,
Allan M. Goose.

Inventor:

John Lanz
By Kay & Totten
Attorneys

No. 675,743.

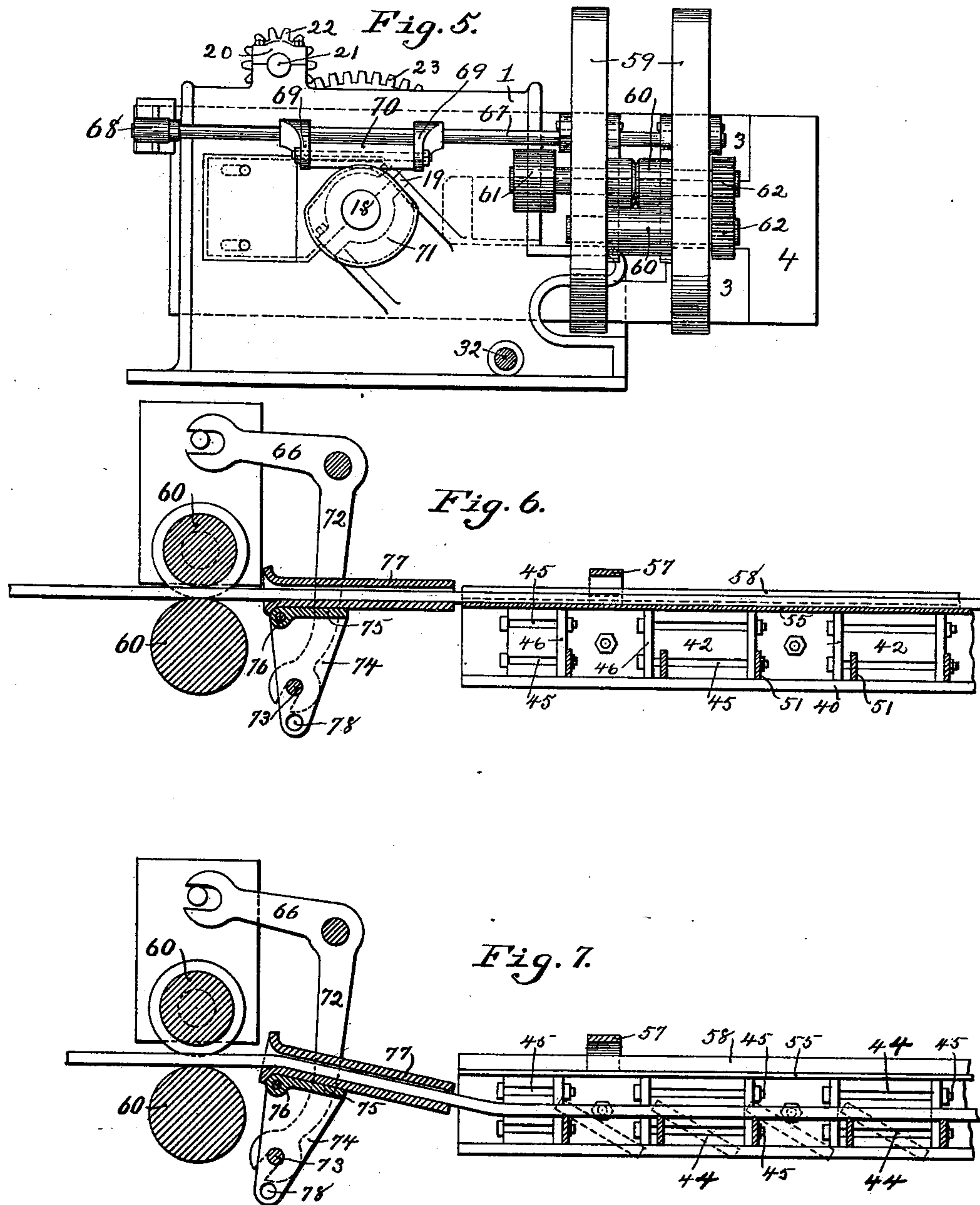
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5 Sheets—Sheet 3.



Witnesses:

Walter Samaries
Allan H. Foote

Inventor:

John Lanz
By Kay & Lott
Attorneys:

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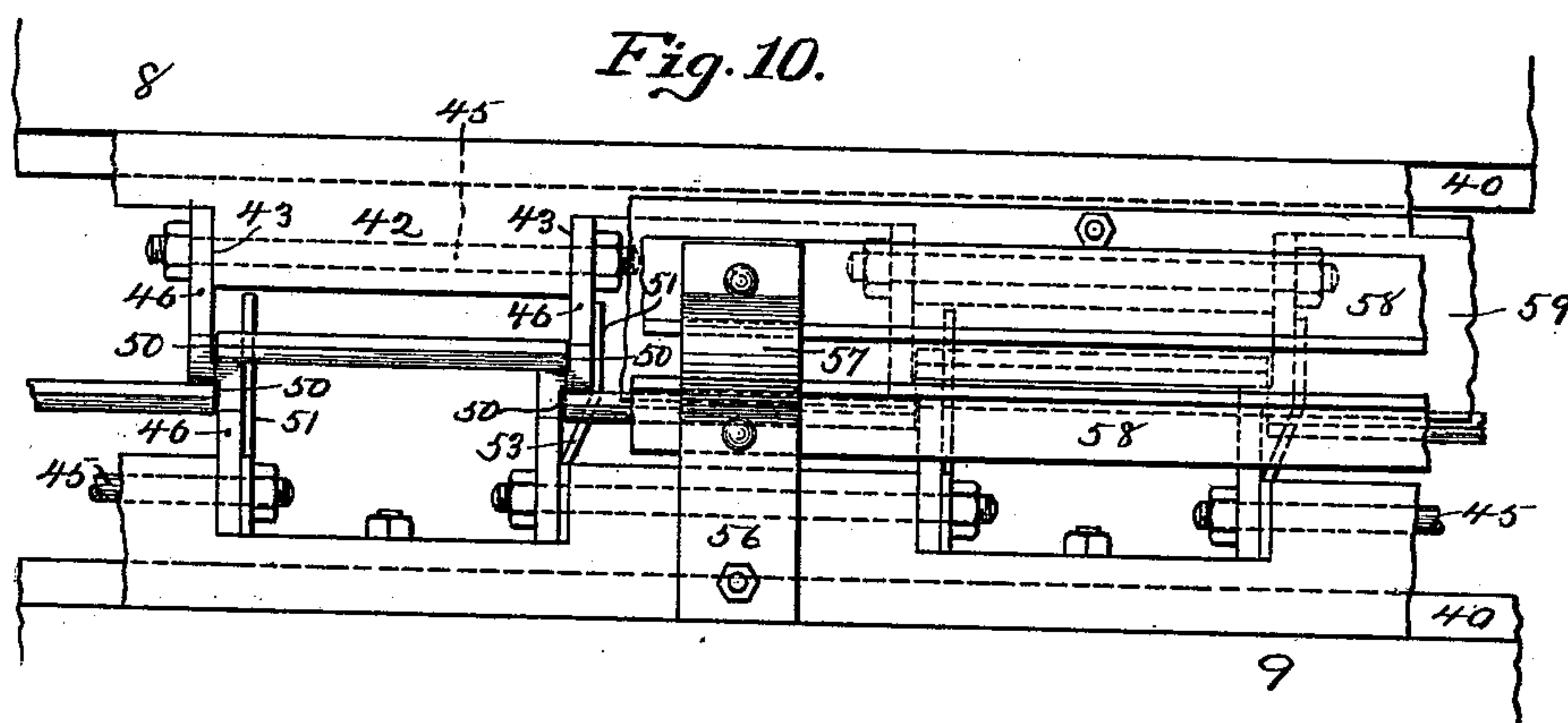
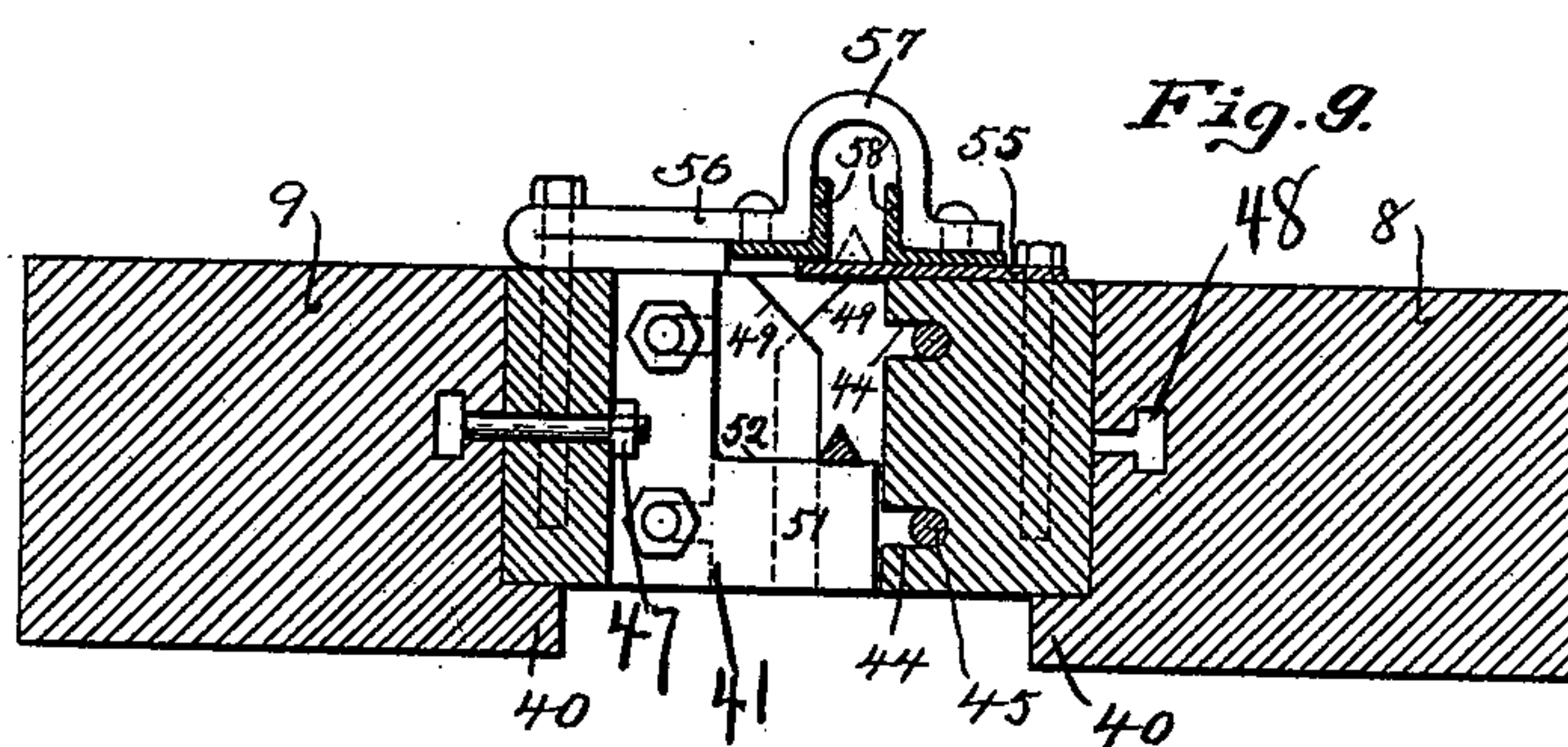
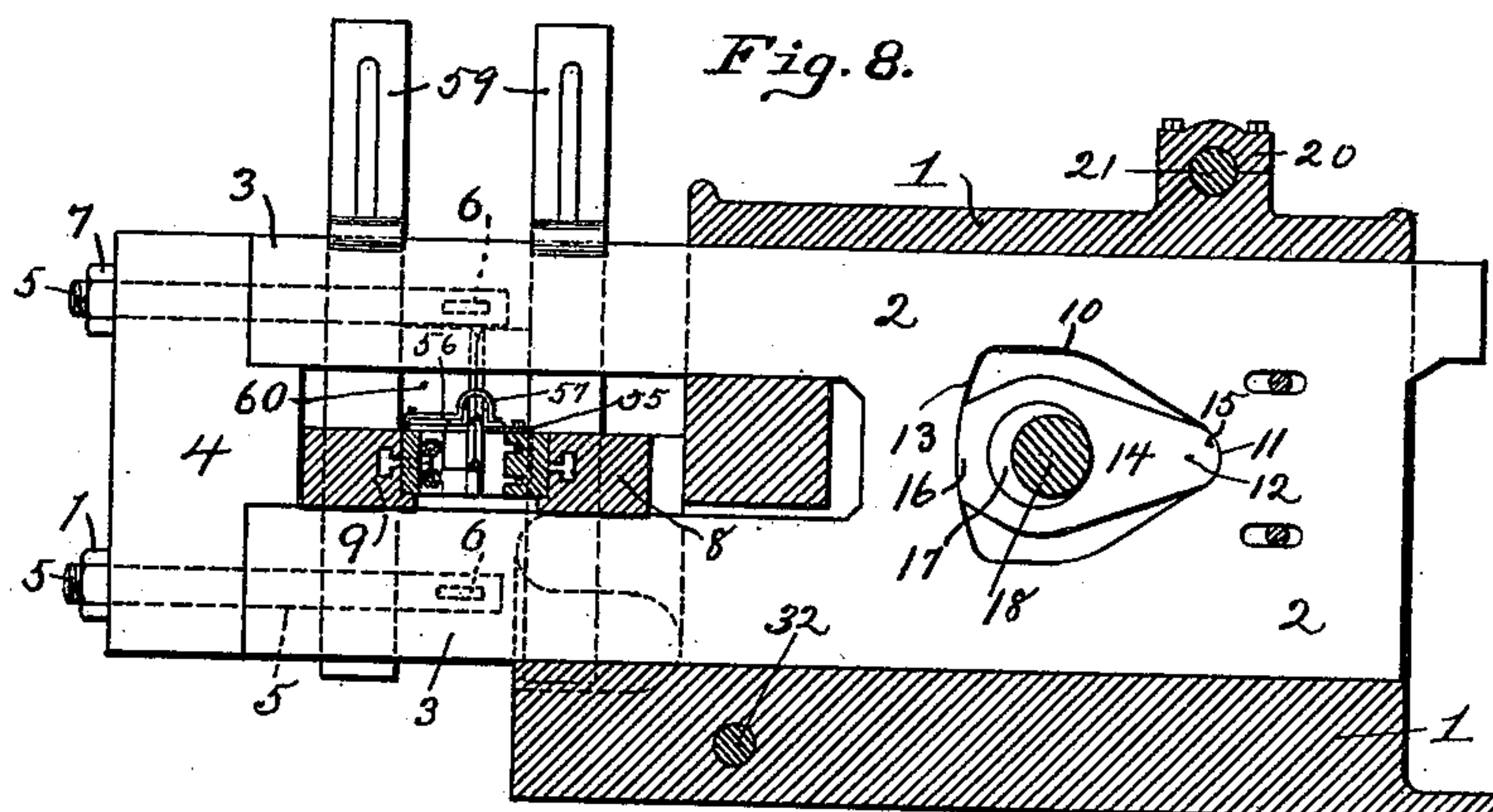
J. LANZ.

METAL SHEARING MACHINE.

(No Model.)

(Application filed July 9, 1900.)

5 Sheets—Sheet 4.



Witnesses:

Walter Tamaris,
Allan H. Foose.

Inventor:

John Lang
By Kay Totten
Attorneys

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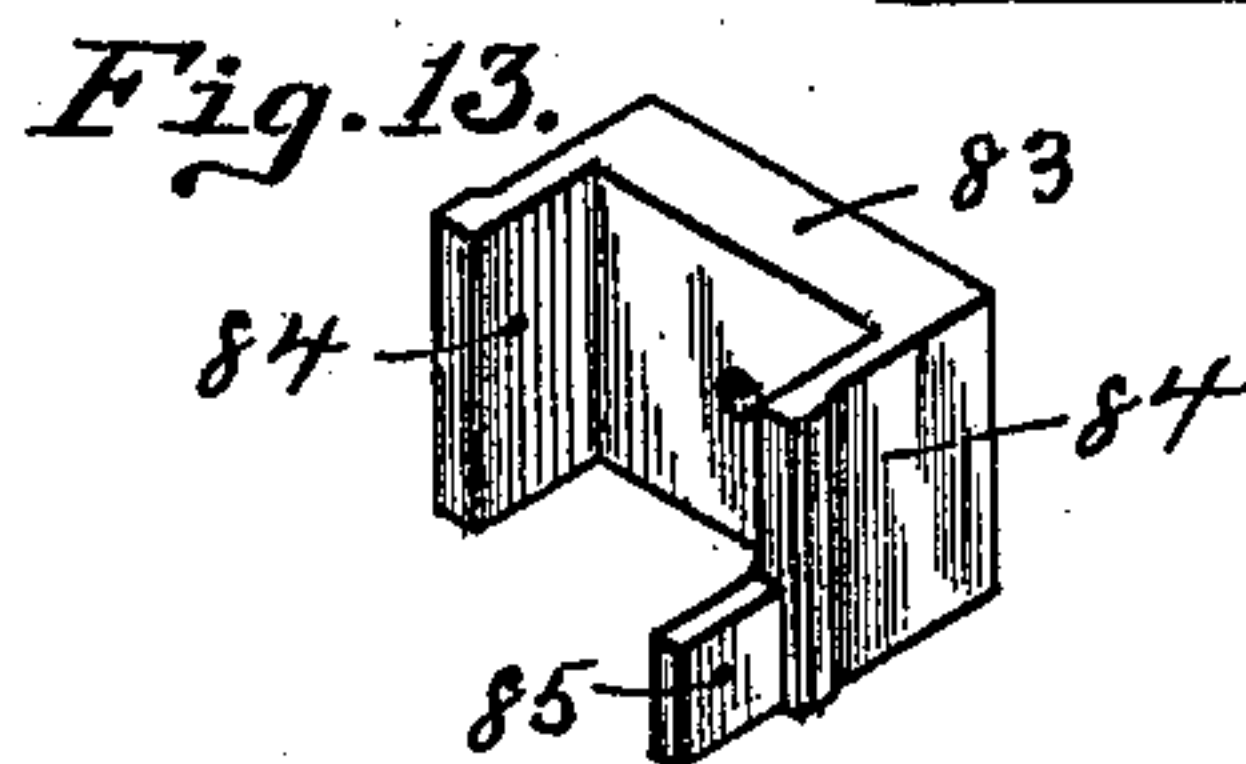
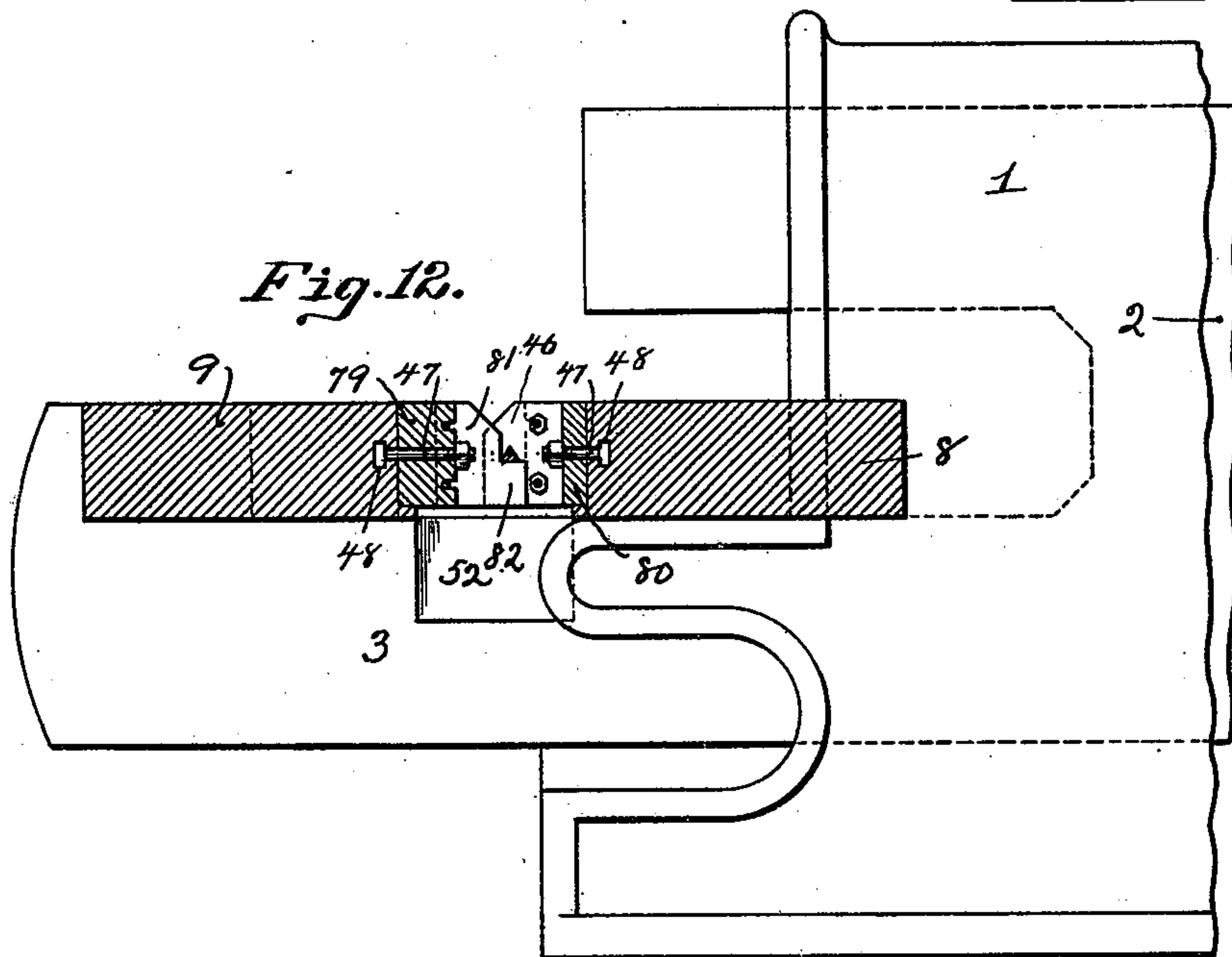
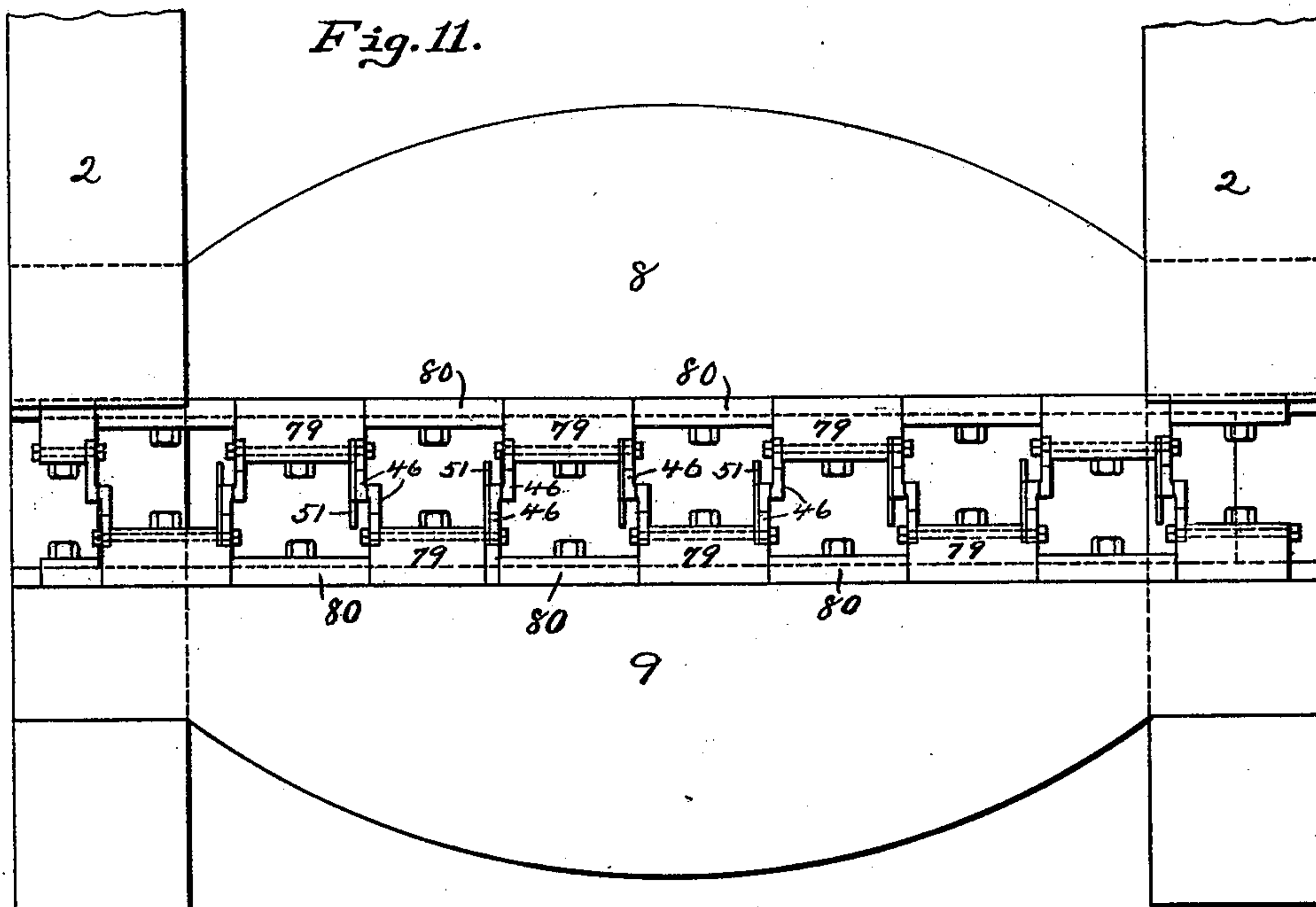
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J. LANZ.
METAL SHEARING MACHINE.

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(No Model.)

5 Sheets—Sheet 5.



Witnesses:
Walter Lammere
Allan H. Grose.

Inventor:
John Lanz
By Ray & Lott
Attorneys.

UNITED STATES PATENT OFFICE.

JOHN LANZ, OF PITTSBURG, PENNSYLVANIA.

METAL-SHEARING MACHINE.

SPECIFICATION forming part of Letters Patent No. 675,743, dated June 4, 1901.

Application filed July 9, 1900. Serial No. 22,940. (No model.)

To all whom it may concern:

Be it known that I, JOHN LANZ, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Metal-Shearing Machines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to a machine for shearing metal bars or rolled shapes, and has for its object a machine of this character adapted to shear a long bar or rolled shape into a number of pieces simultaneously, so constructed that the cut pieces fall clear of the machine as soon as sheared, and provided with means for feeding the bar preferably longitudinally at the proper time and guiding it between the knives, all of which mechanism is automatic and needs no attention, except when very long bars are being sheared at a single stroke the machine must be started after each shearing operation.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a plan view of a machine embodying my invention. Fig. 2 is a vertical cross-section thereof on the line 2 2, Fig. 1. Fig. 3 is a similar view on the line 3 3, Fig. 1. Fig. 4 is a vertical longitudinal section of the front end of the machine through the feeding-rolls and tubular guide. Fig. 5 is a front end view of the machine; Fig. 6, a detail showing the feeding-rolls, tubular guide, and shears. Fig. 7 is a similar view illustrating the operation of the feeding-rolls and tubular guide. Fig. 8 is a vertical cross-section on the line 8 8, Fig. 1. Fig. 9 is a detail cross-section through the shearing-knives. Fig. 10 is a detail plan of the shearing-knives and related parts. Fig. 11 is a similar view of a modification. Fig. 12 is a cross-section showing a modified form of knives, and Fig. 13 is a perspective view of a combined knife and bracket.

My improved machine comprises suitably-cast sleeve frames or standards 1 1, the number thereof depending upon the desired length of the machine, three being illustrated in the drawings; but at least two such frames are necessary. In each of these frames are

mounted horizontal reciprocating heads 2, each head being preferably bifurcated at its forward end to form two legs 3 3, the outer ends of which are united by a cross-head 4, secured to the legs 3 by means of bolts 5 entering openings in said legs and keyed therein, as shown at 6, said bolts having their outer ends threaded for receiving the nuts 7. Between the frames 1 1 and having its ends connected to two adjacent frames is the stationary shear-knife carrier 8, said carrier having its ends straddled by the legs 3 3 of the reciprocating heads 2. Connected to the outer ends of the legs 3 3 of the sliding head 2 just inside of the cross-head 4 is the movable shear-knife carrier 9, and the shearing of the bar is done by knives suitably mounted on the carriers 8 and 9, as will hereinafter appear. Each of the reciprocating heads 2 is provided with an opening 10, which is approximately pear-shaped, the smaller end 11 of which is the arc of a circle struck about the point 12, and the larger end 13 is an arc struck about the same point, but with a longer radius. In this opening is located a toggle member 14, having curved ends 15 and 16, adapted to fit the curved ends 11 and 13, respectively, of the opening 10, said toggle member having a circular opening or bearing therein which is engaged by an eccentric 17 on the shaft 18. This shaft 18 runs the entire length of the machine and is mounted in suitable bearings 19, secured to the frames 1, and has an eccentric 17 thereon at each of the frames 1. Also extending the entire length of the machine and mounted in suitable bearings 20 on the top of the frames 1 is the main power-shaft 21, said shaft being driven in any suitable manner (not illustrated) and having secured thereto, preferably at points between each two adjacent frames 1 1, spur-pinions 22, which mesh with corresponding spur-gears 23, running loosely on the shaft 18. Splined to the shaft 18 adjacent to each spur-gear 23 is a clutch member 24, provided with projections or lugs 25 on the face thereof, which projections are adapted to engage corresponding lugs or recesses formed on the sides of the gears 23. The clutch members 24 are each provided with a collar 26, said collar having a cut-away portion 27. Engaging the side of the collar 26 of each clutch member is a pin

28, projecting downwardly from a bracket 29, suitably secured to the side of a frame 1. Each clutch member 24 is also provided with an annular groove 30, which is engaged by a bifurcated clutch-arm 31, secured to the clutch-rod 32, said rod extending the entire length of the machine and being suitably mounted in the frames 1 1 to slide longitudinally therethrough. On the end of the rod 32 is the collar 33, between which and the end face of the frame 1 is interposed, preferably, a strong spiral spring 34, which tends normally to move said rod endwise to draw the clutch members 24 out of engagement with the gears 23. As long as the pins 28 engage the sides of the collars 26 the spring 34 is prevented from drawing the clutch members 24 out of engagement with the gears 23; but as soon as the shaft 18 and clutch members 24 have rotated sufficiently to bring the recesses 27 in the collars 26 opposite the pins 28 the spring 34 will move the clutch-rod 32 endwise, drawing the clutch member 24 out of engagement with the gears 23, when said gears will run idly on the shaft 18 and the reciprocation of the heads 2 2 is stopped. In shearing very long bars this operation takes place at each revolution of the shaft 18 and just after each shearing operation is completed. In order to again start the machine, a lever 35, pivoted as at 36 and lying between the collar 33 and a similar collar 37, secured to the clutch-rod 32, is employed. This lever moves the rod 32 endwise against the tension of the spring 34 and is held momentarily until the clutch members 24 have rotated sufficiently to bring the sides of the collars into engagement with the pins 28, when said lever can be released, and the clutch members will stay in engagement with the gears 23 until the recesses 27 again come opposite the pins 28, when the spring 34 will again move the rod 32 to throw the clutch members 24 out of engagement with the gears 23 and stop the machine.

Instead of moving the clutch-rod by a hand-lever, as shown, it may be moved by suitable treadle mechanism or motive cylinder, as will be readily understood. In case the machine is only long enough to cut a short bar or a short length of a long bar at a single stroke or in case the bar is fed into the machine sideways, as may be done, it is not necessary to stop the machine after each shearing operation, and in such cases the lever 35 is locked to hold the clutch members 24 in engagement with the gears 23, so that the machine will run continuously. This locking may be done by any suitable means, such as by a dog 38 on said lever engaging a notch in the stationary arch-bar 39.

Each of the knife-carriers 8 and 9 is provided on its inner face with a projecting ledge 40, upon which are seated the knife-holders 41. These knife-holders, as shown in Fig. 10, are provided with a series of projections 42, having flat end faces 43 at right angles to the

length of the knife-carriers. The projections 42 are preferably provided with continuous slots 44, extending out to the front face thereof, in which slots are seated bolts 45, by means of which the knives 46 are clamped against the end faces 43 of the projections. The slots 44 enable the bolts 45 to be slipped in sideways, which is necessary, as the space between the projections 42 is not sufficient to allow said bolts to be inserted from the end. A knife 46 is held on each end face 43 of the projections 42, and the two knives are clamped to the knife-holder by means of a single bolt 45. Instead of having a single bolt 45 lying in a continuous slot 44 for securing two knives to a projection 42 I may employ two short bolts having heads on their inner ends which lie in T-recesses formed in the face of the projection 42, as will be readily understood. The knife-holders 41 are secured to the carriers 8 and 9 by means of bolts 47, having their heads seated in T-slots 48 in said carriers. The knives have their upper inner corners cut away at an angle of forty-five degrees, as shown at 49, whereby said knives form a V-guide to direct the bar between themselves as soon as they are opened far enough to receive the bar. They are also cut away back of their front edges, as shown at 50, to afford clearance for the cut pieces.

The projections 42 on the stationary knife-carrier are opposite the depressed portions on the movable knife-carrier, so that when the knives 46 are secured to said projections in the manner above described two adjacent knives on the movable knife-carrier pass between two adjacent knives on the stationary knife-carrier, so that a blank as it is sheared off moves bodily sideways, both ends being carried in the same direction. This is absolutely necessary, for if each pair of shearing-knives were arranged exactly similar to all the other pairs of shearing-knives then one end of the blank would be carried in one direction and the opposite end in the opposite direction, thereby bending and otherwise mutilating the blank, besides requiring more power to operate the machine; but by having two adjacent knives on one carrier passing in between two adjacent knives on the opposite carrier this difficulty is avoided. Also clamped to the projections 42 of the movable knife-carrier by means of the bolts 45 are the depending brackets 51, said brackets having the horizontal portion 52, the upper face of which serves as a support for the bar to be sheared, as shown in Fig. 9. Each alternate one of these brackets is deflected sideways, as indicated at 53, so that it will pass beyond the knife 46 on the stationary knife-carrier, and the several supports 52 are so located that a severed blank is engaged by only one of said supports, and this engagement is at one end of said blank, so that the blanks will naturally tip down in the manner illustrated in dotted lines in Fig. 7 and fall out of the machine endwise. To insure

the severed blanks clearing the machine, the lower legs 3 of the reciprocating heads 2 are beveled off, as shown at 54. Furthermore, by arranging the machine horizontally and so it does the shearing while the heads 2 and carriers 9 are under tension the parts of said machine are so located that very few of said parts are in the path of the severed blanks, so that the latter can pass out of the machine with the least possible obstruction. It is obvious that the lower leg 3 might be dispensed with in this construction, thereby removing all obstructions in the path of the severed blanks; but such a change would weaken the machine and is therefore not desirable.

Secured to the upper face of the stationary knife-carrier 8 is the ledge 55, said ledge consisting of a plate bolted to the top of the knife-carrier. This plate forms the bottom of the feeding-trough and receives the bar to be sheared when said bar is fed endwise upon said plate by the feeding-rolls hereinafter described, this feeding operation taking place while a previous bar is being sheared and before the shearing-knives have opened sufficiently far to receive a bar therebetween. Secured to the movable knife-carrier 9 are a series of connectors 56, said connectors being bent up in U shape, as at 57, and having bolted thereto the angle-irons 58, which extend the full length of the machine, the vertical webs thereof forming the sides of the feeding-trough. As the movable knife-carrier 9 moves outward to open the knives the trough formed by the angle-bars 56 moves the bar to be sheared sidewise and sweeps it off of the ledge 55 onto the upper edges of the shear-knives, the V-guides 49 of which direct said bar onto the supports 52, in which position it is in proper position to be sheared by the knives 46 upon the inward movement of the movable knife-carrier 9.

Secured to the legs 3 of the reciprocating head in the front frame 1 are the housings 59, in which housings are suitable journal-boxes for the feeding-rolls 60, one of which, preferably the upper one, is suitably grooved to fit the contour of the bar to be sheared. These rolls are driven continuously at a comparatively fast speed by means of a pulley 61, secured to the shaft of one of said rolls, the other roll being geared to the driven roll through the spur-gears 62. The pulley 61 is driven by a belt from any suitable source of power. The journal-boxes of the lower roll are adjusted by means of screws 63, and the journal-boxes of the upper roll are held down by means of the springs 64, interposed between said boxes and the adjustable blocks 65, so that said roll may be moved upward against the tension of said spring in order to release the bite of the rolls on the bar to be cut when the machine is not of such length as to receive the entire length of the bar, thereby stopping the feed of the bar into the feeding-trough, as must be done during the interval that the bar is being sheared. When the ma-

chine is of such length as to receive the entire length of the bar, it is still necessary to separate the feeding-rolls in order to prevent them from feeding another bar into the trough before the latter is in proper position to receive it. In order to release the bite of the rolls on the bar, the journal-boxes of the upper roll are engaged by rocker-arms 66, secured to the rock-shaft 67, mounted in bearings in the housings 59 and in a bearing 68, secured to the rear end of the reciprocating head 2. Also secured to said rock-shaft are rocker-arms 69, between the outer ends of which is located the bearing-block 70, which is engaged by a cam 71 on the outer end of the shaft 18. Also secured to the rock-shaft 67 are two depending rocker-arms 72, having their lower ends forked to engage a pin 73 on the depending members 74 of the guide-support 75, said support being pivoted at 76 and having secured to the upper side thereof the tubular guide 77. Through the lower ends of the depending members 74 are perforations 78, through which a bolt is adapted to be passed and secured to the stationary frame, when the pin 73 is removed and the tubular guide thrown out of operation, as will hereinafter appear.

It will be observed that the housings of the feed-rolls, the tubular guide 77, and the rock-shaft 67 are all mounted on the reciprocating head 2 and move sidewise therewith. This is necessary because the bar to be sheared is fed upon the ledge 55 and is then moved sidewise by the trough 58 to drop down between the shearing-knives, and as a consequence the feed-rolls and appurtenant devices must move sidewise with said bar. When a sufficient length of bar has been fed into the machine, the cam 71 rocks the shaft 67, thereby raising the upper roll 60, releasing the bite on the bar, and preventing further feeding of the bar into the machine. At the same time that this takes place the bar is swept off the ledge 55, and as said bar falls off said ledge the upper roll 60 is being raised by the rock-shaft 67, and at the same time the tubular guide 77 is tilted to the position shown in Fig. 7, thereby bending the bar and depressing the inner end thereof, so that it is in proper position to be sheared. In case the machine has enough reciprocating heads to shear the entire bar in one stroke, then the whole length thereof may be rapidly fed into the machine, thereby freeing the bar from the rolls and tubular guide, and the tilting of the guide is unnecessary. In such case the pin 73 is removed and a pin or bolt is passed through the openings 78 into the stationary part of the frame to hold the guide 77 in a horizontal position. The upper feed-roll 60, however, is nevertheless raised in order to prevent a workman thrusting another bar into the rolls to be fed into the machine before the latter or the feed-trough is ready to receive the same, as above described.

Figs. 11, 12, and 13 illustrate modified forms of knife-blocks and knives. When the ma-

chine is used for shearing cold bars, or even with hot bars, the feeding-rolls may be dispensed with and the bar fed by hand or otherwise sidewise into the machine; but in shearing hot bars it is desirable to feed the bars endwise into the trough, above described, which serves to straighten the bars, so that they readily fall between the knives, and at the same time the severed blanks will be straight. In case the bars are fed sidewise into the machine the ledge 55, trough 58, and necessary parts may be dispensed with and the upper legs 3 of the reciprocating heads 2 cut off, as shown in Fig. 11, so that the bar to be sheared can be laid into the V-guide formed by the cut-away corners of the knives, so that when the knives separate the bar will fall down upon the supports 52, in which position it is sheared when the knives again close up. In this case the machine may run continuously, as a bar can be fed thereto at each stroke.

Instead of making the knife-holders 41 the full length of the knife-carriers and providing them with projections 42 said holders may be made in separate blocks 79, to which the knives are secured, as before described. The blocks 79 are secured to the knife-carriers by bolts and T-slots, as in the other forms, and are held from moving endwise by suitable spacing-plates 80, located therebetween and similarly secured to the knife-carriers. By this construction the length of the article to be sheared can be regulated by merely changing the blocks 79, and blanks of different length can be sheared at the same time by making some of said blocks 79 longer than others.

In Fig. 11 the brackets 51 are shown as secured alternately to the stationary and movable knife-carriers instead of all being secured to the movable carrier, thereby obviating the necessity of offsetting every alternate bracket to bring the supports 52 in proper position to engage one end only of the severed blank. The supports 52 instead of being formed on brackets 51 may be an integral part of the knives, as shown in Fig. 12, wherein 81 represents the knife, and 82 the support integral therewith.

In Fig. 13 the knife-holder, knives, and support are all shown integral, 83 being the knife-holder, 84 the knives, and 85 the support. This knife-holder is secured to the knife-carrier by a bolt and T-slot, as in the other forms. This construction is desirable when shearing blanks of very short length.

The operation of the machine is as follows: The lever 35 is moved to move the rod 32 against the tension of the spring 34, thereby moving the clutch members 24 into engagement with the spur-gears 23. This starts the main shaft 18, thereby causing a reciprocation of the heads 2 and the rotation of the cam 71. The latter is so shaped and arranged on the shaft 18 that the upper feed-roll 60 is held out of contact with the lower feed-roll 60 until the reciprocating heads have reached

a position wherein the feeding-trough is in proper condition to receive the bar to be fed therein. The cam 71 then rocks the shaft 67, allowing the upper feed-roll to be depressed to bite upon the rod, and the latter is rapidly fed into the feed-trough. On the outward movement of the reciprocating heads and movable knife-carriers the bar is swept off the ledge 55 and falls into the V-guide formed by the cut-away upper corners of the knives. As soon as the knives are fully separated the bar falls between the same upon the horizontal portions of the brackets 51. The cam 71 has in the meantime rocked the shaft 67 to raise the upper feed-roller to release the bite upon the bar. The reciprocating heads then move inward, thereby shearing the bar between the series of knives. As soon as the bar is severed the cam 71 again allows the upper feed-roller to drop and the guide 77 to be tilted upward, whereby the bar is again rapidly fed upon the ledge 55, from which it is swept upon the next outward movement of the reciprocating heads and knife-carriers.

When cutting up a bar at one stroke, the speeds of the various parts of the machine are so related and timed that a bar is fed upon the ledge 55 while a previous bar is being sheared, and as soon as the entire length of bar is fed thereon the machine-clutch is thrown in and the bite of the feed-rolls on the bar is released, and on the outward movement of the movable knife-carrier the bar is swept off the ledge 55 and in between the shears. As soon as the bar is sheared the machine is stopped by means of the automatic or self-acting clutch heretofore described.

The machine is practically automatic, except when shearing very long bars, as from a modern rolling-mill, it stops after each shearing operation and must then again be started by the lever 34 or similar device.

What I claim, and desire to secure by Letters Patent, is—

1. In a metal-shearing machine, a series of stationary knives, a corresponding series of movable knives, said knives having their upper meeting corners cut away to form a V-guide and means for actuating said movable knives simultaneously.

2. In a metal-shearing machine, the combination with suitable frames, of stationary knives carried by said frames, a horizontally-reciprocating head mounted in each of said frames and projecting beyond the stationary frames, movable knives carried by said reciprocating heads, and means for actuating said reciprocating heads.

3. In a metal-shearing machine, the combination with a series of frames, of stationary knife-carriers connected to adjacent frames, a reciprocating head mounted in each of said frames, knife-carriers connected to adjacent heads, a series of coacting knives secured to said knife-carriers, and means for actuating said heads simultaneously.

4. In a metal-shearing machine, the combi-

nation with suitable frames, of stationary knives carried by said frames and projecting outwardly therefrom, a horizontally-reciprocating head mounted in each of said frames and projecting beyond the stationary frames, movable knives carried by said reciprocating heads and projecting toward the frames, and means for actuating said reciprocating heads.

5. In a metal-shearing machine, the combination with suitable frames, of stationary knives carried by said frames and projecting outwardly therefrom, a reciprocating head mounted in each frame and projecting below and beyond the stationary knives, the portion of said head lying below the stationary knives having its upper surface beveled off, movable knives carried by said reciprocating heads, and means for actuating said reciprocating heads.

6. In a metal-shearing machine, a series of stationary knives, a corresponding series of movable knives, means for moving said movable knives simultaneously in a horizontal plane, constantly-driven means for feeding a bar to said knives, and automatic means for stopping the machine after each cutting operation.

7. In a metal-shearing machine, a series of stationary knives, a corresponding series of movable knives, means for actuating said movable knives simultaneously, constantly-driven means for feeding a bar to said knives, means for rendering said feeding means inoperative until the knives are in proper position to receive the bar, and automatic means for stopping the movable knives after each cutting operation.

8. In a metal-shearing machine, a stationary knife, a movable knife, a driven shaft and connections for actuating said movable knife, constantly-driven rolls for feeding a bar to said knives, a cam on said shaft, and connections for separating said feeding-rolls until the knives are in proper position for receiving the bar, and a self-acting clutch for stopping said driven shaft after each cutting operation.

9. In a metal-shearing machine, a series of stationary knives, a corresponding series of movable knives, a ledge above said stationary knives for receiving the bar, and means for moving the bar off said ledge and between said knives.

10. In a metal-shearing machine, a series of stationary knives, a corresponding series of movable knives, a ledge above said stationary knives, means for feeding a bar onto said ledge, means actuated by the movable knives for moving the bar off said ledge and between said knives, and means for rendering the feeding means inoperative until the knives are in proper position to receive the bar.

11. In a metal-shearing machine, a stationary knife-carrier and a movable knife-carrier, a series of corresponding knives on each carrier, a ledge above said stationary knives for receiving the bar, and a trough secured to the

movable knives for moving the bar off said ledge and between said knives.

12. In a metal-shearing machine, a stationary knife-carrier and a movable knife-carrier, a series of corresponding knives on each carrier, a ledge above said knives, driven rolls for feeding a bar onto said ledge, means secured to the movable knife-carrier for moving the bar off said ledge and between said knives, and means for rendering said feeding-rolls inoperative until the means secured to the movable knife-carrier is in position to allow the bar to be fed onto the ledge.

13. In a metal-shearing machine, a series of stationary knives, a corresponding series of movable knives, a ledge above said stationary knives for receiving the bar, means for feeding a bar onto said ledge, means for moving the bar off said ledge and between said knives, and a tilting guide between the feeding means and the knives.

14. In a metal-shearing machine, a series of stationary knives, a series of corresponding movable knives, a ledge above said stationary knives for receiving the bar, driven rolls for feeding a bar onto said ledge, means for moving the bar off said ledge and between said knives, means for separating said rolls and simultaneously tilting said guide.

15. In a metal-shearing machine, the combination with a suitable frame, of a stationary knife connected to said frame, a reciprocating head mounted in said frame, a movable knife connected to said head, and a pair of feed-rollers mounted on and moving with said reciprocating head.

16. In a metal-shearing machine, a stationary knife, a movable knife, a support above said stationary knife for receiving the bar, means movable with the movable knife for sweeping the bar off said support, and means for feeding the bar onto said support, said feeding means being movable with the movable knife.

17. In a metal-shearing machine, a stationary knife-carrier, a movable knife-carrier, a series of coacting knives on each of said carriers, a ledge on said stationary knife-carrier for receiving the bar, a trough connected to said movable carrier, driven rolls for feeding a bar onto said ledge and into said trough, a guide between said rolls and said trough, said rolls and guide being movable with the movable knife-carrier.

18. In a metal-shearing machine, a stationary knife-carrier, a movable knife-carrier, a corresponding series of knives on each carrier, a ledge on said stationary carrier for receiving the bar, a trough secured to said movable carrier, driven rolls for feeding a bar onto said ledge, a pivoted guide between said rolls and ledge, means for separating said rolls, and simultaneously tilting said guide, said rolls and guide being movable with the movable carrier.

19. In a metal-shearing machine, a series of

stationary knives, a corresponding series of movable knives, a ledge above said stationary knives for receiving the bar, driven rolls for feeding a bar onto said ledge, means connected to the movable knives for moving the bar off said ledge and between said knives, a pivoted guide, means for separating the driven rolls until the means connected to the movable knives is in proper position to allow the bar being fed onto the ledge, and detachable connections between said means and the guide.

20. In a metal-shearing machine, two corresponding series of knives arranged in a horizontal plane, means for opening and closing said knives, and means secured to the knife-carriers to support the bar between said knives during the shearing operation.

21. In a metal-shearing machine, two corresponding series of knives arranged in a horizontal plane, means for opening and closing said knives, and means at each pair of knives to support the bar during the cutting operation and one end of the cut blanks.

22. In a metal-shearing machine, two corresponding series of side-acting shearing-knives, means for opening and closing said knives, and a set of supports for holding the bar between said knives during the shearing operation, the whole being so arranged that the cut pieces fall freely from the machine.

23. In a metal-shearing machine, two corresponding series of three or more side-acting knives, means for opening and closing said knives, said knives being so arranged that two adjacent knives of one series pass between two adjacent knives of the other series, and a set of supports for holding the bar between said knives during the shearing operation, the whole being so arranged that the cut pieces fall freely from the machine.

24. In a metal-shearing machine, the combination with a suitable frame, of a series of stationary side-acting knives carried by said frame, a reciprocating member mounted in said frame and projecting beyond the same, a series of movable side-acting knives carried

by said reciprocating member, means for actuating said reciprocating member, and means for supporting the bar between said knives during the shearing operation.

25. In a metal-shearing machine, a series of stationary knives, a corresponding series of movable knives, said knives having their upper meeting corners cut away to form V-guides, means for actuating said movable knives, and a bracket at each pair of knives, said bracket carrying a support for the bar.

26. In a metal-shearing machine, a series of stationary knives, a series of corresponding movable knives, a ledge above said stationary knives for receiving the bar, a support at each pair of knives, means for feeding a bar onto said ledge, and means connected to the movable knives for moving the bar off said ledge and onto said supports.

27. In a metal-shearing machine, the combination with suitable frames, a stationary knife-carrier secured to said frames, a reciprocating head mounted in each of said frames, a movable knife-carrier secured to said sliding heads, a series of coacting knives secured to each of said knife-carriers, a driven shaft, eccentrics thereon, and rocking bars between said eccentrics and the reciprocating heads.

28. In a metal-shearing machine, a knife-carrier, a series of blocks carrying knives secured thereto at intervals, and spacing-blocks between said knife-blocks, and secured to said knife-carrier.

29. In a metal-shearing machine, a stationary knife-carrier, and a movable knife-carrier, a series of blocks carrying knives secured to each of said carriers, said blocks being so arranged that two adjacent knives of one series pass between two adjacent knives of the other series.

In testimony whereof I, the said JOHN LANZ, have hereunto set my hand.

JOHN LANZ.

Witnesses:

F. W. WINTER,

ROBERT C. TOTTEN.