

No. 737,930.

PATENTED SEPT. 1, 1903.

G. J. HOLL.
METAL EXPANDING MACHINE.

APPLICATION FILED NOV. 25, 1902.

NO MODEL.

6 SHEETS—SHEET 1.

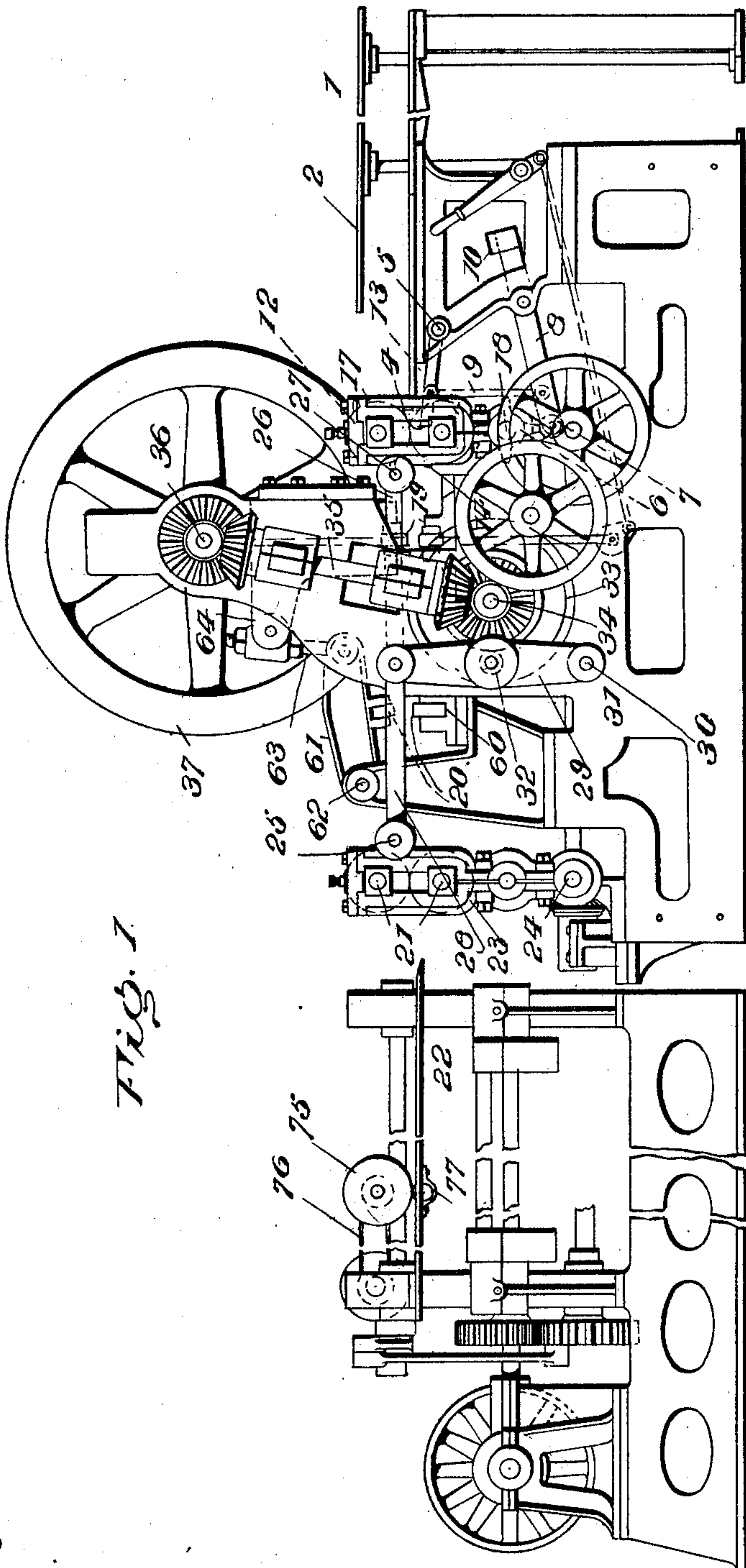


Fig. 1

WITNESSES:

Geo. M. M. M.
Charles L. M. M.

INVENTOR

BY

Gustav J. Holl

J. M. M. M.
Attorney

No. 737,930.

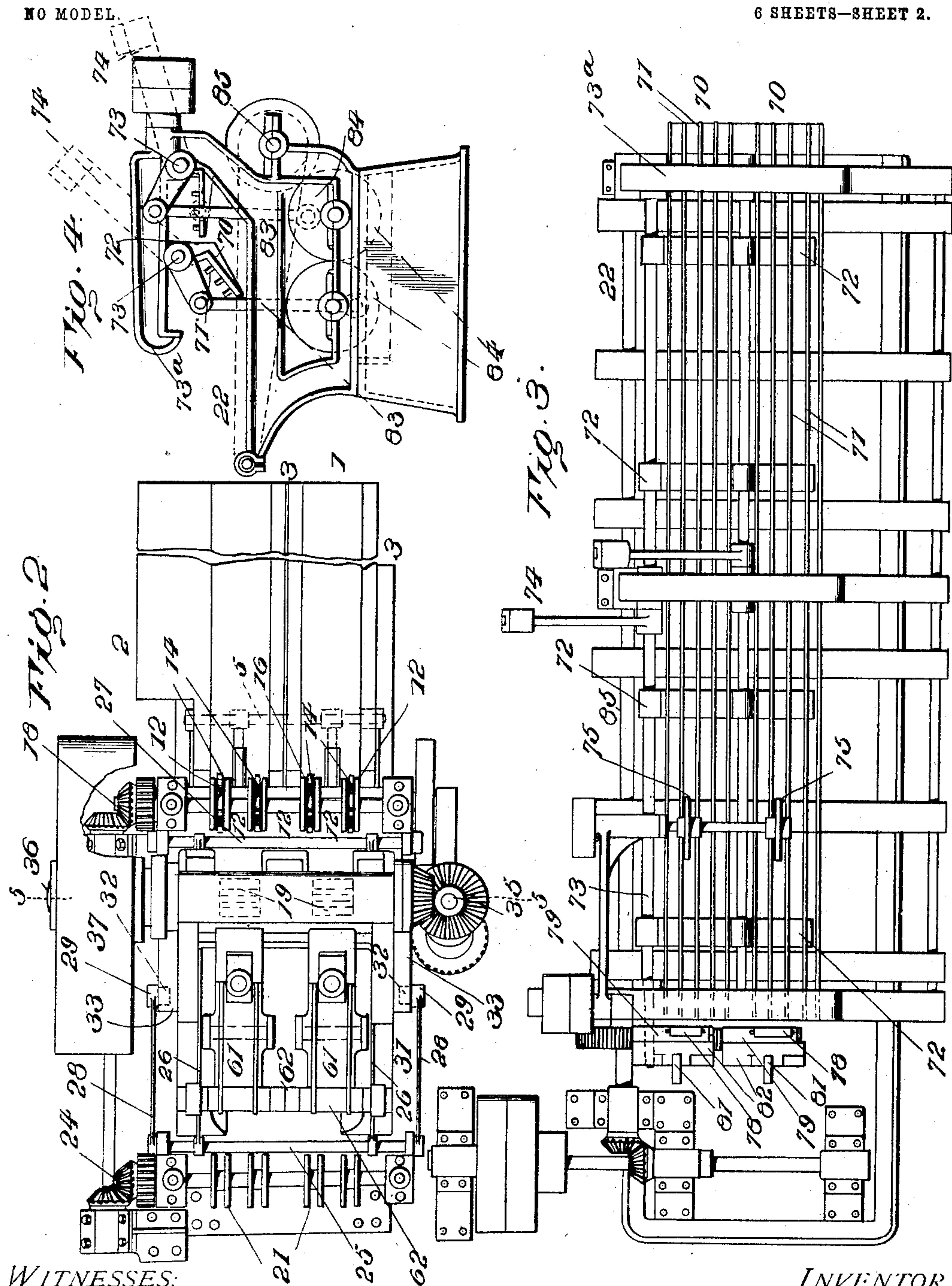
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NO MODEL.

6 SHEETS—SHEET 2.



WITNESSES:

J. W. Irvine
Charles L. Miller

INVENTOR
Gustav J. Holl

By

Charles L. Miller
Attorney

No. 737,930.

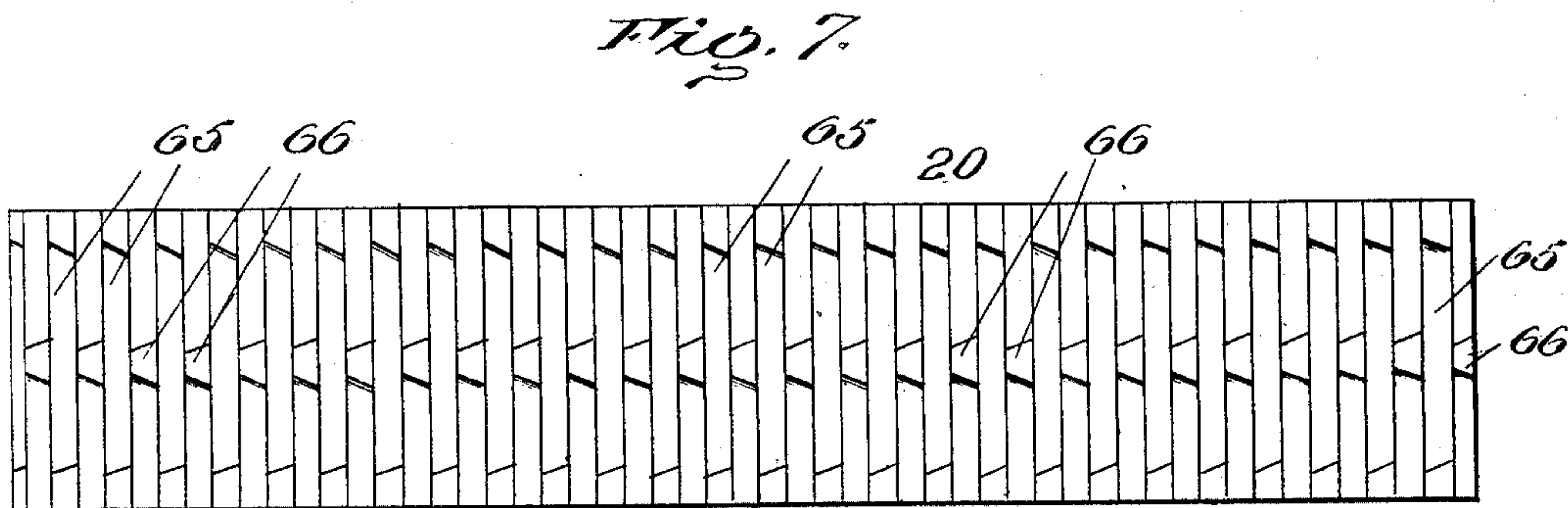
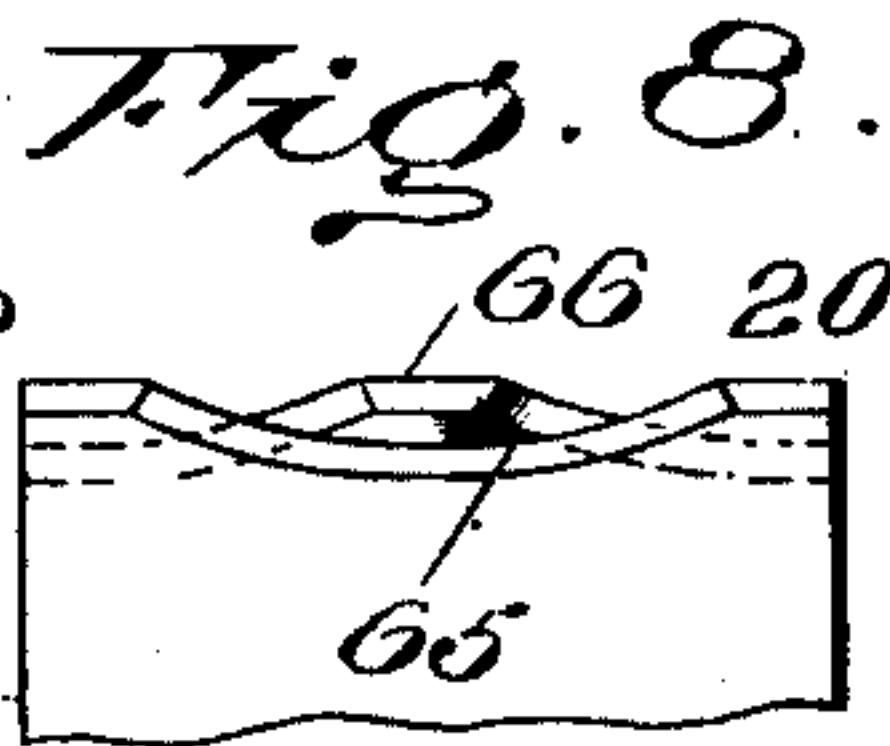
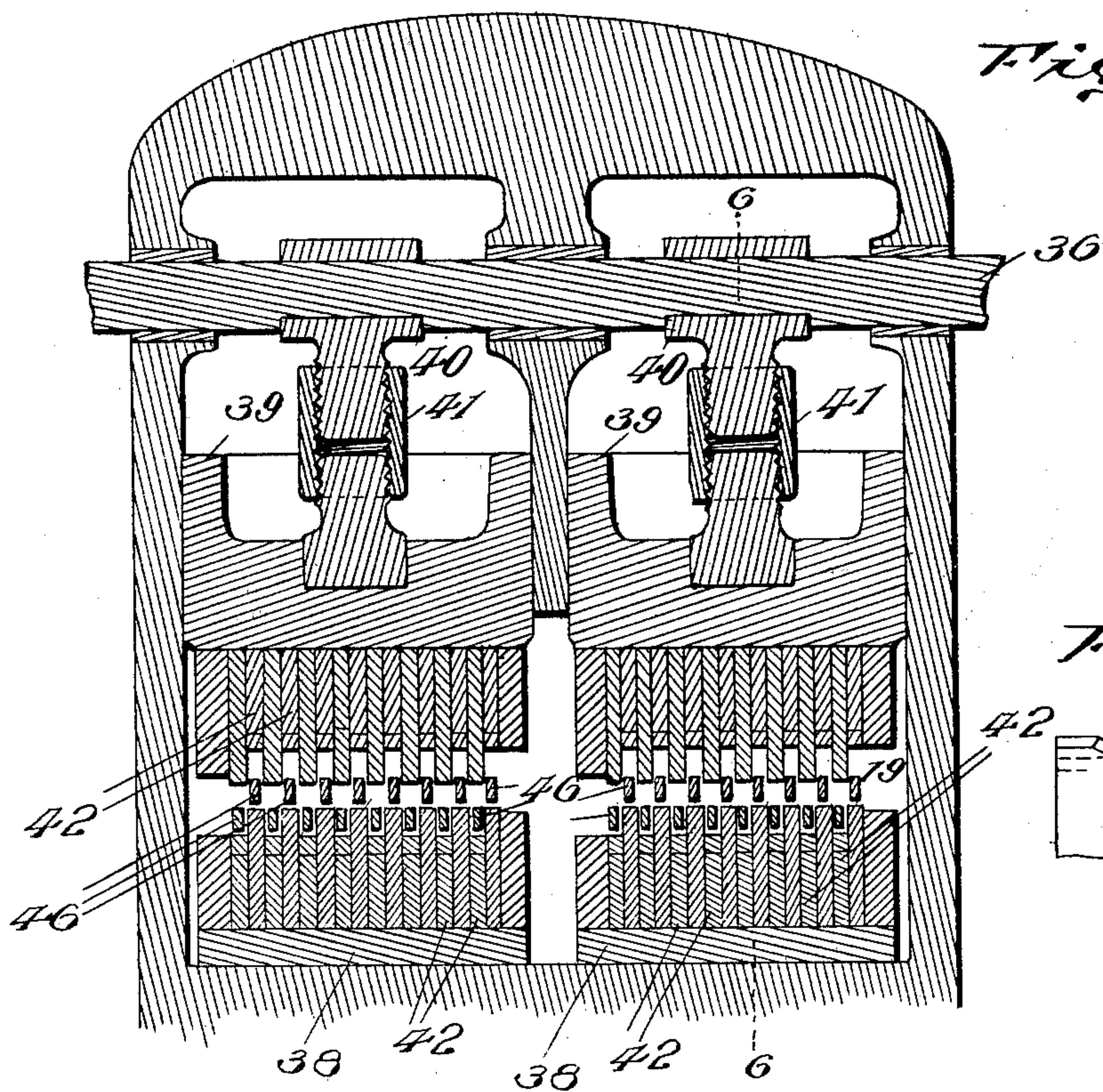
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6 SHEETS—SHEET 3.



WITNESSES:

W. J. Miller
Charles L. Miller

INVENTOR

Gustav J. Holl.

BY

W. J. Miller
Attorney

No. 737,930.

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6 SHEETS—SHEET 4.

Fig. 6.

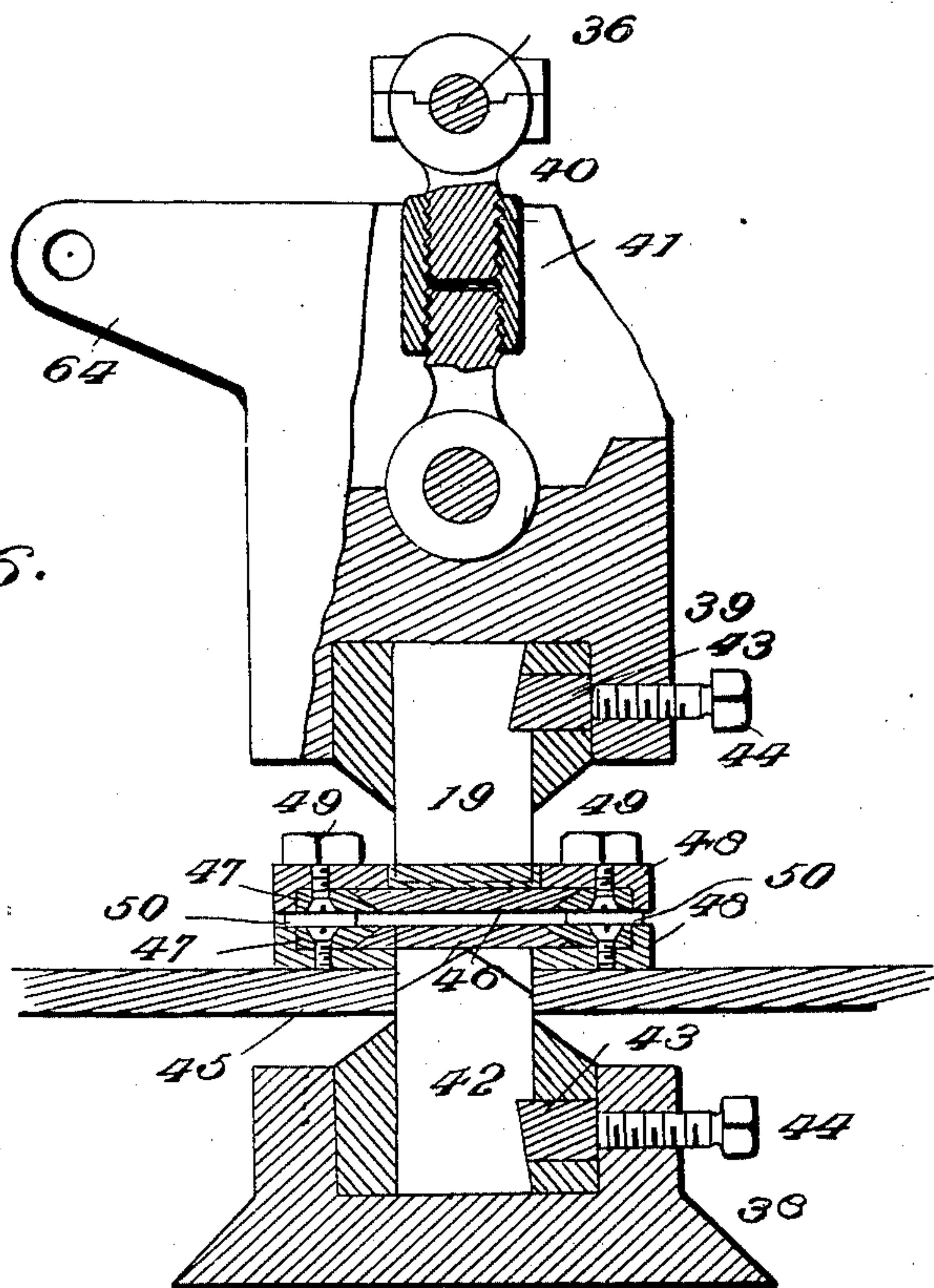
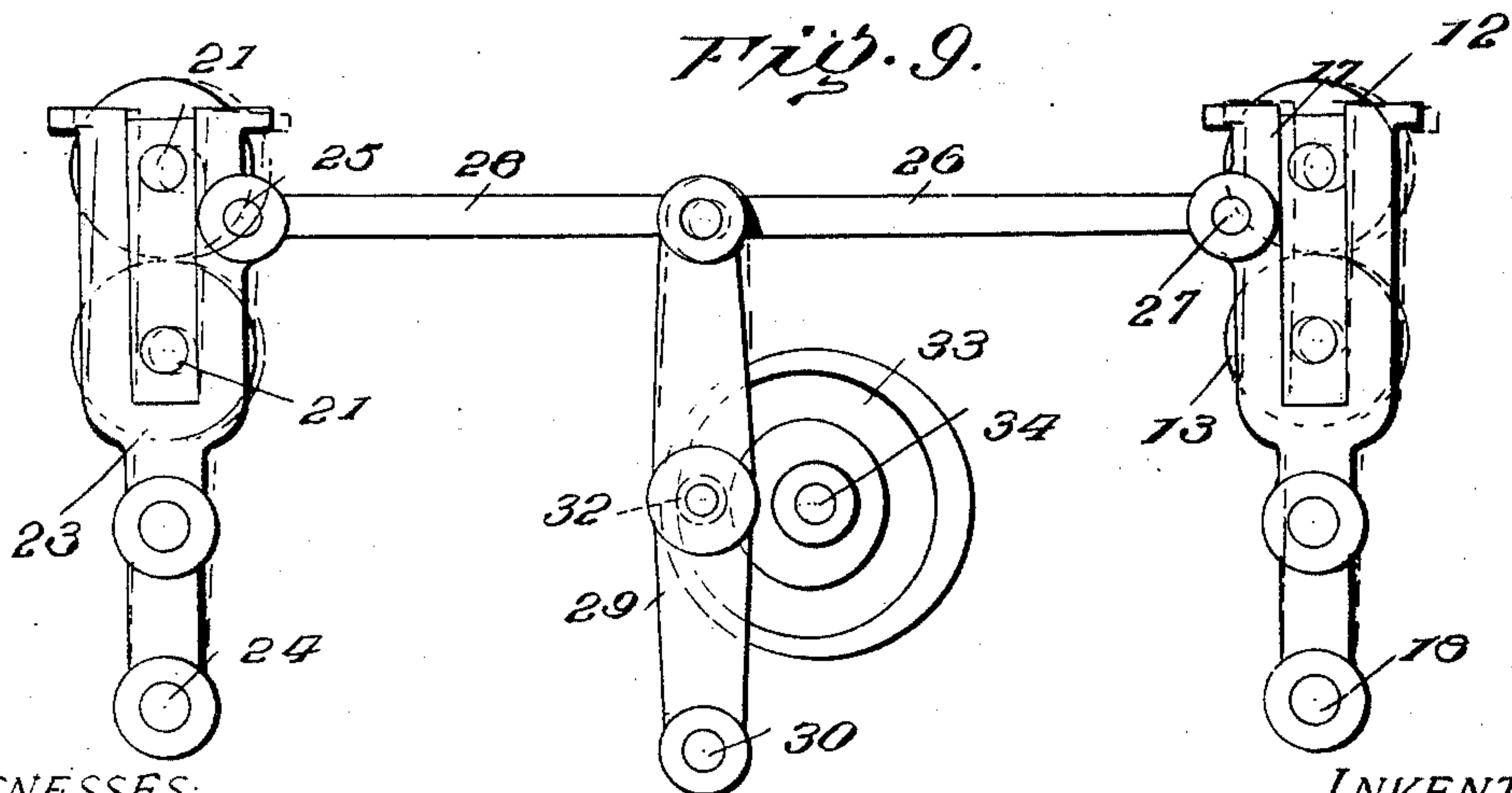


Fig. 9.



WITNESSES:

John J. Miller
Charles L. Miller

INVENTOR

Gustav J. Holl

By

J. H. Miller
Attorney

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6 SHEETS—SHEET 5.

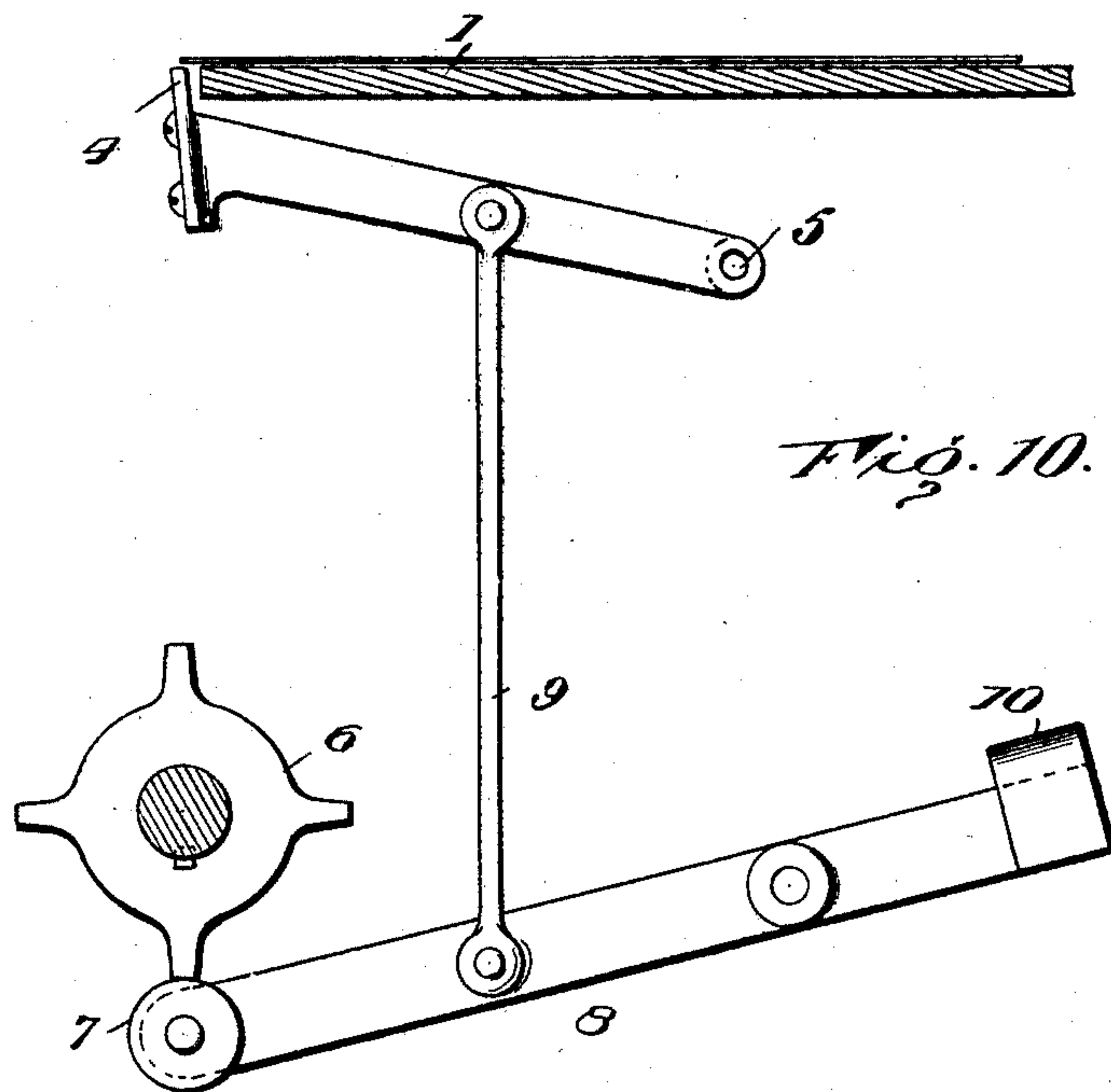


Fig. 10.

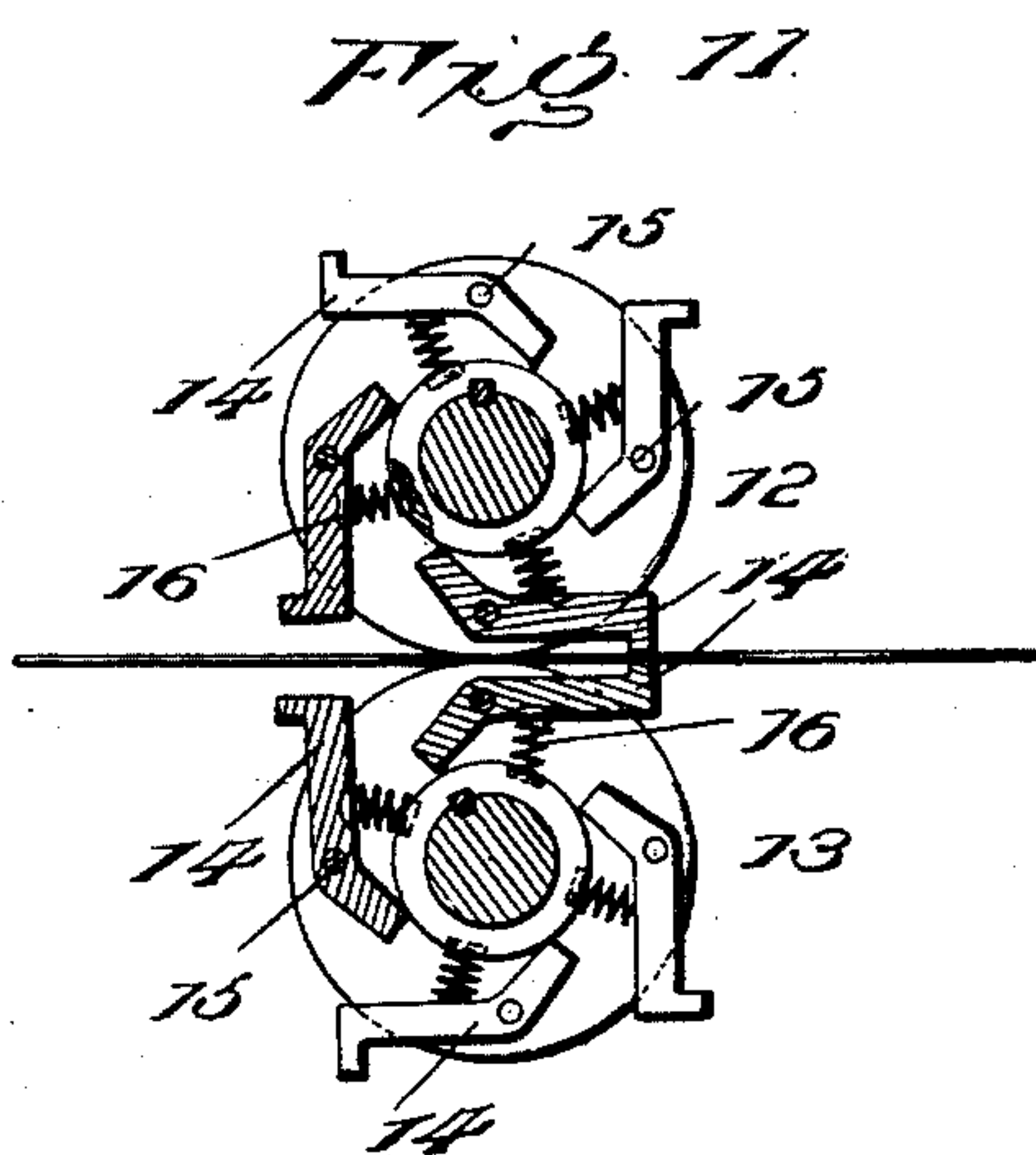


Fig. 11.

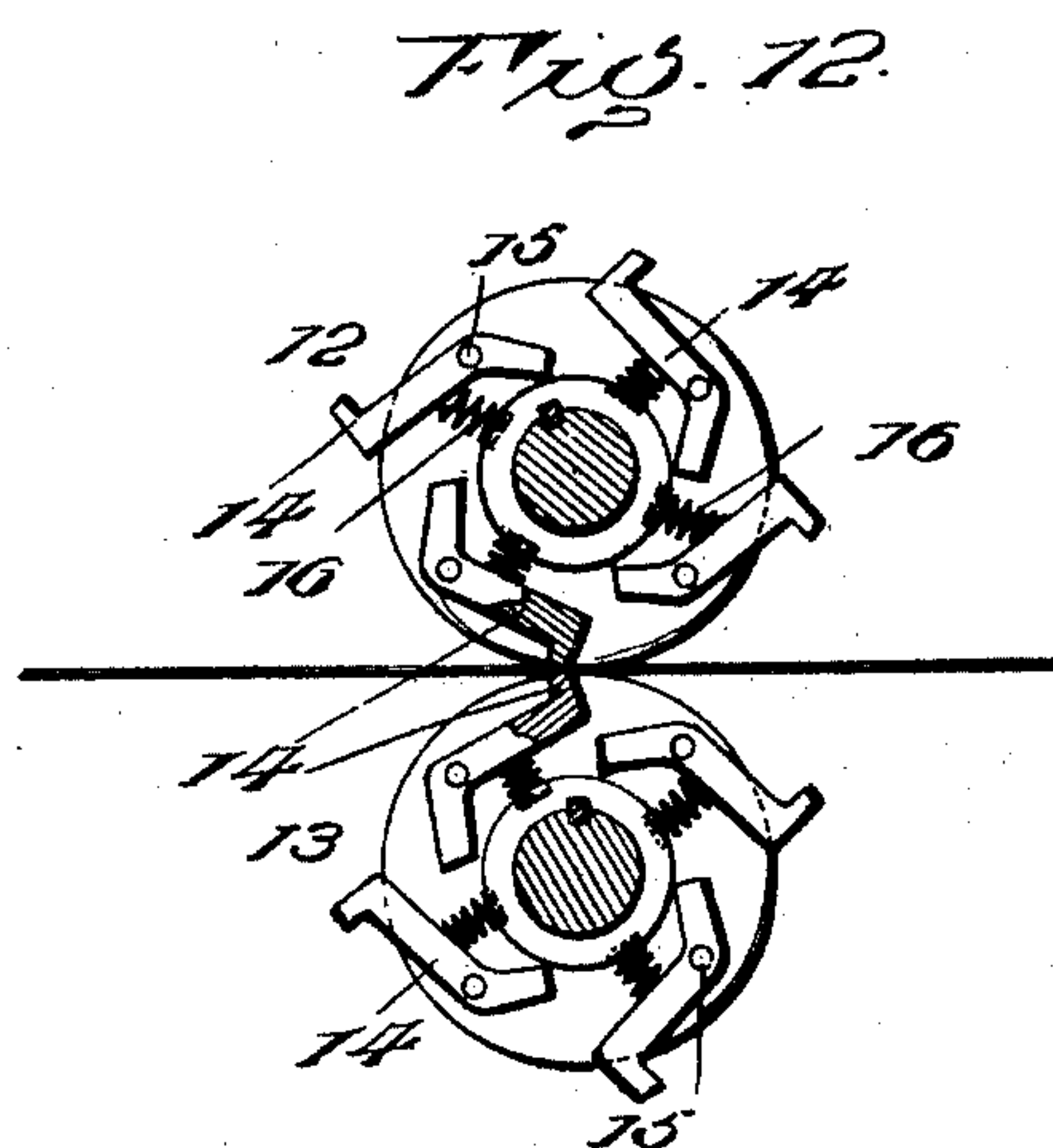


Fig. 12.

WITNESSES:

Wm. H. Holl
Gustav J. Holl

INVENTOR

Gustav J. Holl

BY

Wm. H. Holl
Attorney

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NO MODEL.

6 SHEETS—SHEET 6.

Fig. 13

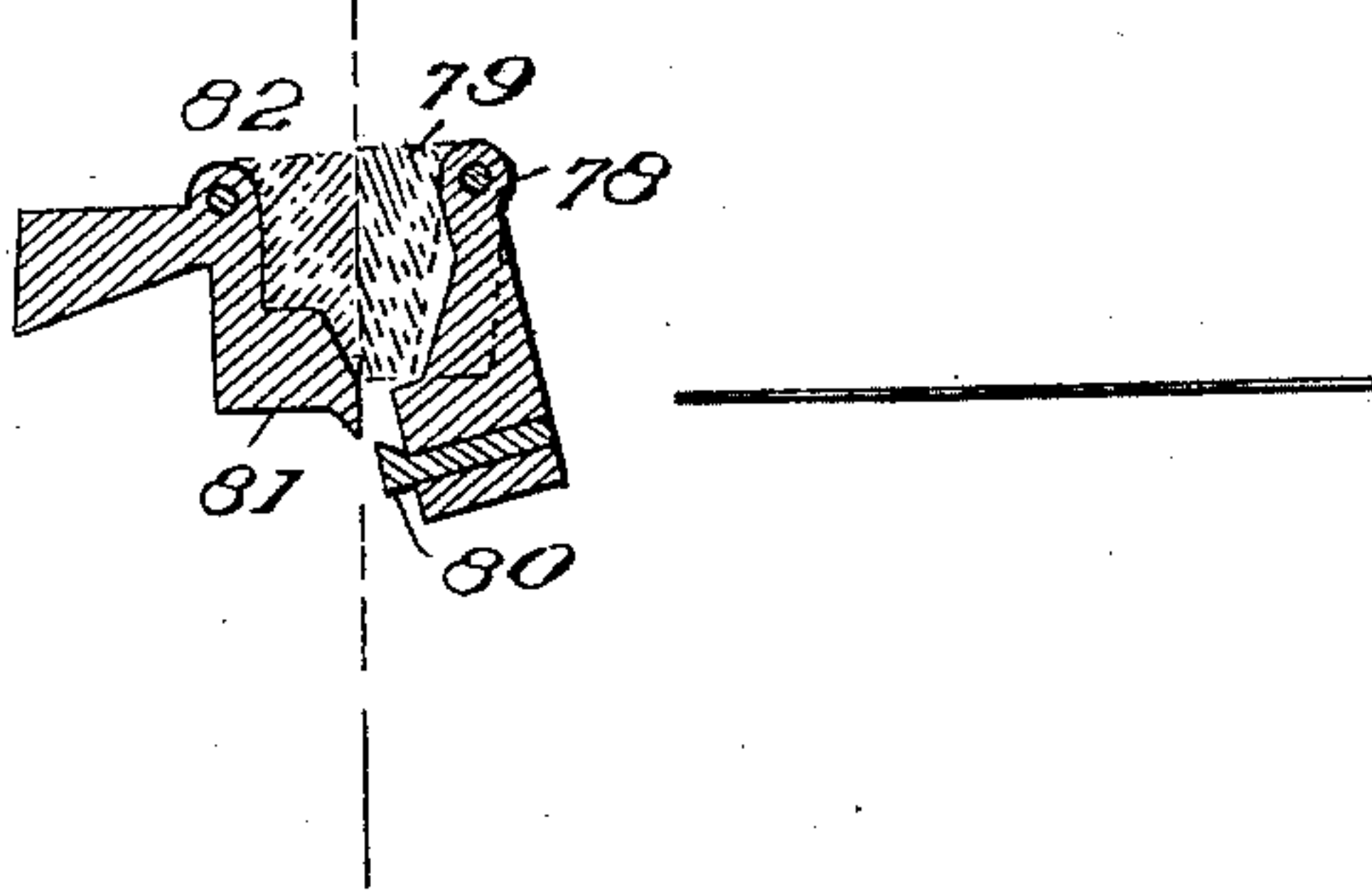


Fig. 14

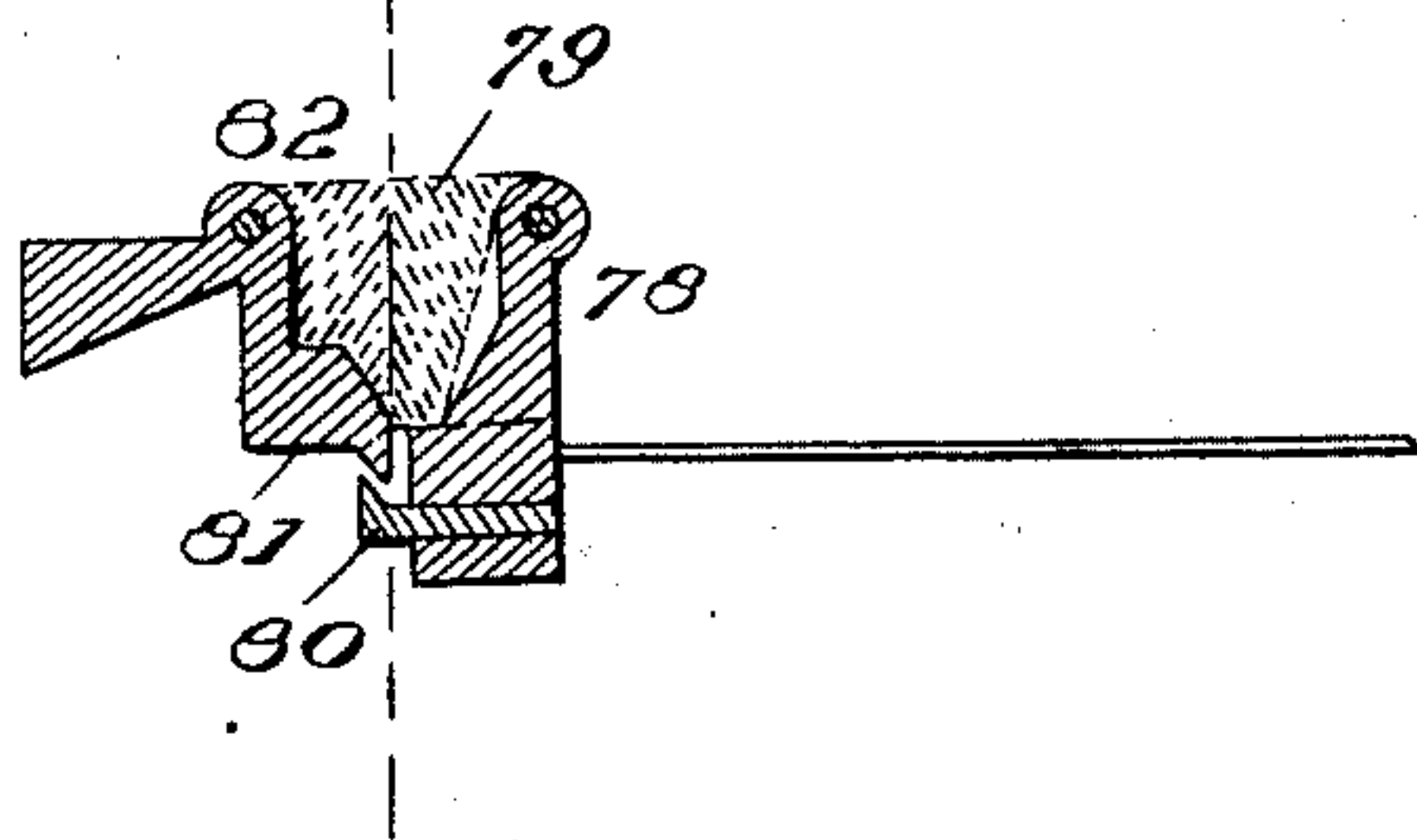
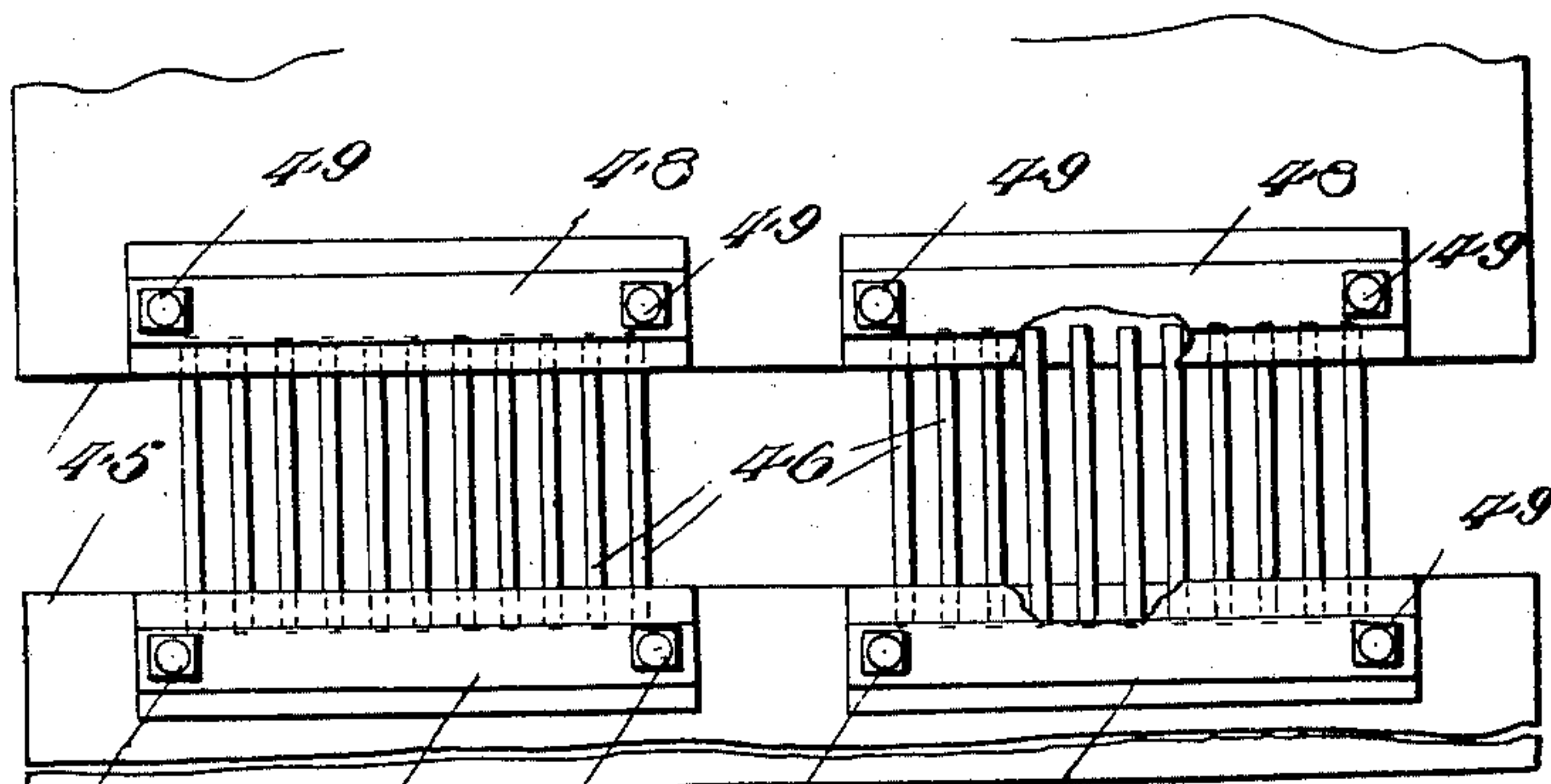


Fig. 15



WITNESSES:

49 48 49 49 48

INVENTOR

Gustav J. Holl

BY

[Signature]

Attorney

UNITED STATES PATENT OFFICE.

GUSTAV J. HOLL, OF CLEVELAND, OHIO, ASSIGNOR TO WM. G. HURLBERT
AND EVAN J. JOB, OF NILES, OHIO.

METAL-EXPANDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 737,930, dated September 1, 1903.

Application filed November 25, 1902. Serial No. 132,791. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV J. HOLL, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Metal-Expanding Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The primary object of this invention is to provide simple and highly-improved machinery for manufacturing expanded metallic lathing.

A further object is to provide means for automatically feeding a metallic sheet up to the slitting-dies and to also effect the forcing or distention of the slitted portions in opposite directions away from the plane of the sheet in one passage of the latter, the slitting and distending being performed while the feeding operation is being continued.

A further object is to provide improved means for effecting the automatic discharge of the slitted sheets from the machine and delivery-table onto a conveyer or other support; and a further object is to provide a machine of the character herein stated which aside from being positive and effective in its operation will be entirely automatic.

The invention will be hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation with portions of the supply and delivery tables broken away. Fig. 2 is a plan view with the supply and delivery tables removed. Fig. 3 is a plan view of the latter table. Fig. 4 is an end view thereof. Fig. 5 is a vertical transverse sectional view through the slitting-dies and coacting parts, taken about on line 5 5, Fig. 2. Fig. 6 is a sectional view on line 6 6, Fig. 5. Fig. 7 is a plan view of one of the distending-dies. Fig. 8 is an end view thereof. Fig. 9 is a detached view of the frames of the feed and withdrawal rolls, showing their rearward positions in dotted lines. Fig. 10 is an enlarged view of one of the stops and the operating mechanism therefor. Fig. 11 is an enlarged view of the feed-rolls and grippers, the latter

being shown in position approaching a firm contact with a sheet. Fig. 12 is a view of the same parts, showing the grippers in firm contact with the sheet. Fig. 13 is an enlarged detail view showing the dogs of the delivery-table in their normal position—that is, out of engagement. Fig. 14 is a view of the same parts, showing one of the dogs moved by the slitted and distended sheet so as to be engaged by the other or coacting dog. Fig. 15 is a plan view of the stripper-bars and their supports.

Referring to the drawings, 1 designates a feed-table, and 2 a shelf at one side thereof, the table being equipped with side and central gages 3 for directing the passage of two sheets at a time. At the discharge end of this table are two stops 4, mounted on a cross-rod 5, such stops being designed to normally project just above the edge of the table to arrest the passage of sheets. At the proper time—to wit, at each complete cycle of the machine—cams 6 on one of the shafts of a train of gearing engage rollers 7 in the ends of levers 8, which levers are connected by links 9 to the stops 4, thereby drawing downwardly on the latter to allow a sheet to pass from the supply-table. The stops are held in their normal positions by weights 10 on levers 8.

The sheets are withdrawn from the feed-table and fed to the machine by feeding mechanism, shown as composed of upper and lower feed-rolls 12 and 13 and grippers 14. (See Figs. 11 and 12.) These feed-rolls consist each of two spaced-apart disks between which the grippers are pivotally hung. The grippers consist of angularly-bent fingers hung on cross-pins 15 with their outer ends extended tangentially beyond the peripheries of the disks, being normally held outwardly by springs 16. When two coöperating grippers of coacting feed-rolls simultaneously engage a sheet, they are turned on their pivots as against the action of their springs 16, and their normally outer ends are forced inwardly toward the axes of the two feed-rolls, as shown in Fig. 12. These grippers being extended tangentially beyond the feed-rolls contact with the upper and lower surfaces of the sheet in advance of the engagement of the

latter with the coacting feed-rolls, serving thereby in the revolution of the latter to draw the sheet into and between them, the peripheries of such rolls acting on the sheet to feed it forward independently of the grippers. In the further revolution of the feed-rolls the grippers release their hold on the sheet and are again forced outwardly under the action of their springs 16. The shafts of these feed-rolls have their bearings in opposite upright frames 17, which frames are pivotally supported at their lower ends on a cross-shaft 18, permitting them to be swung backward and forward within an arc of a circle. The sheet passing beyond the feed-rolls is engaged by a series of slitting-dies 19, by which it is slitted longitudinally, and thereupon it is engaged by upper and lower distending-dies 20, the purpose of which is to force adjacent slitted portions in opposite directions away from each other. Passing beyond the distending-dies, the sheet is engaged by a set of withdrawal-rolls 21, the function thereof being to insure the passage of the sheet through the machine after it is free of engagement with the feed-rolls 12 and its delivery onto the delivery-table 22.

As before stated, the frames carrying the bearings of the feed-rolls 12 are pivotally mounted at their lower ends. The corresponding frames 23 of the withdrawal-rolls 21 are likewise mounted on a cross-shaft 24. To a cross-rod 25, supported by these frames 23, are connected two links 26, which at their rear ends are secured to a cross-rod 27, supported by frames 17 of the feed-rolls. A second set of links 28 connect cross-rod 25 to the upper ends of two arms 29, pivoted at 30 to frame 31. These arms 29 support each a roller 32, engaged by cams 33, whereby the two sets of frames carrying the feed and withdrawal rolls are in each cycle of operation caused to move rearwardly—that is, in opposition to the direction of travel of the sheets—a limited distance, as shown in Fig. 9. By this construction I am enabled to continue the operation of the feed-rolls, as well as the operation of the withdrawal-rolls, while the sheet is held stationary by the slitting-dies or the distending-dies, or both, without danger of buckling consequent upon over-feeding, as would occur if the feed-rolls remained in fixed position and in continuous operation while either or both sets of dies were acting on the sheets. The cams 33 are on a cross-shaft 34, which is driven by a miter-gearing between itself and an inclined shaft 35 at one side of frame 31, such latter shaft at its upper end having a miter-gearing connection with a main crank-shaft 36, whereon is the driving-wheel 37, to which a belt (not shown) is designed to be applied. Motion from shaft 34 is communicated, through a train of gearing, to the feed-roll shafts, and, as shown in Fig. 2, a miter-gearing between shaft 18 and shaft 24 (upon which the two roller-frames are pivoted) communi-

cates motion to the shafts of the withdrawal-rolls. The cams 6 are on one of the gearing-shafts mounted in frames 17.

Slitting-dies.—There are two sets of slitting-dies, as well as two sets of feed-rolls, distending-dies, and withdrawal-rolls, thereby allowing for working two sheets at a time. Each set of slitting-dies consists of an upper vertically-reciprocating series and a lower stationary series, the latter being mounted in a cross-piece or housing 38 of frame 31 and the former in vertically-movable housings 39. These latter housings are connected by links 40 to the main crank-shaft 36, each link having a turnbuckle 41 to permit of easy adjustment. The dies of the upper and lower series are arranged alternately, as shown in Fig. 5, the dies of each series being separated by blocks or plates 42 sufficiently to accommodate the dies of the other series. The blocks 42 are beveled outwardly from their centers, so as to direct away from the dies any scale that may be cut from the sheets during the splitting thereof. Each of the dies and each of the spacing-blocks of each series is cut out and beveled along one edge to accommodate a locking wedge-block 43, held in place by set-screws 44. The two sets of dies are coincident with an opening formed in a table 45 of frame 31. This table for the purpose of forming this opening is composed of two parts or sections, their inner opposite edges being disconnected save through the intermediary of two series of upper and lower stripper-bars 46, the bars of each series being interposed in line between the dies of the respective upper or lower series. At their ends these stripper-bars are beveled to conform to corresponding bevels of retaining-plates 47, held to upper and lower tie-plates 48, which latter are secured by bolts 49 to the table 45 adjacent to the opening therein, and they are held slightly separated between their opposite faces by washers 50. The function of this arrangement is that a sheet after being slitted is prevented from binding between any of the dies, the several stripper-bars serving to force the sheets out of engagement with the dies immediately upon the upper dies being elevated or withdrawn. This is due to the fact that the stripper-bars being held only at their ends and spanning the opening in the table have a certain amount of spring or resiliency, which, together with the spring or resiliency inherent in the table itself, tends to cause the stripper-bars to immediately resume their normal positions upon removal of the pressure of the upper dies. Thus a sheet is prevented from adhering to either set of dies. Furthermore, by beveling the edges of the spacing-blocks 42 scale is prevented from accumulating between the dies, being directed away therefrom by said blocks, with the result that the dies may be freely worked without danger of binding or being injured by the accumulation of scale.

Distending-dies.—The lower distending-

dies are fixedly mounted each in a base 60, supported by frame 31, while the upper distending-dies depend from arms 61, pivotally hung on a cross-rod 62, and at their free ends these arms are connected by links 63 to rearward extensions 64 of the vertically-movable housings 39. By this means the upper distending-dies are alternately raised and lowered simultaneously with the raising and lowering of the upper series of slitting-dies. As shown in Figs. 7 and 8, these dies have on their faces alternate concaves 65, between which are central projections 66, also concaved on either side of their centers. By this construction the dies upon engaging opposite sides of a sheet, adjacent to the slits thereof, distend or force the slitted portions upwardly and downwardly—that is, in opposite directions in planes at substantially right angles to the plane of the sheet—thereby forcing the slitted or separated sections of the sheet apart and increasing the size of each slit looking at the latter transversely. Now that the sheet has been slitted and the slitted portion distended it is taken up by the withdrawal-rolls, which when the sheet has one passed free of the feeding-rolls control the further passage of the sheet through the machine and effect its discharge therefrom.

Delivery-table.—Upon the sheet leaving the slitting and distending machine it is fed by the withdrawal-rolls onto the delivery-table 22. This table is composed of two tilting sections 70, each a practical duplicate of the other, the two being provided to receive two sheets as they leave the die-machine. Each of these tilting sections consists of a series of longitudinal rods 71, supported at periodical distances by arms 72, fast on a longitudinal shaft 73, supported by a frame 73^a. Each table-section is held in its normal horizontal position by a weighted arm 74, also secured to shaft 73. As a sheet is about to pass free of the withdrawal-rolls it is engaged by a feed-roll 75, driven by a belt 76, which feed-roll, coacting with a lower feed-roll 77, feeds the plate to the extreme rear end of the table-section. Upon reaching this end the plate comes in contact with a dog 78, pivotally hung from an arm 79, fast on shaft 73, at the end thereof. This dog has a shouldered pin 80 extending from its outer face, and by reason of the weight of its lower end normally occupies the position shown in Fig. 13—that is, out of the range of movement of a second dog 81, pivotally hung in a second arm 82. This latter arm is loosely journaled at one end on shaft 73, and to its other end is connected a pitman 83, which is actuated by a wheel 84, to which motion is communicated from drive-shaft 85. As stated, dog 78 in its normal position is out of the range of movement of dog 81, which latter in the constant raising and lowering of arm 82 through the action of pitman 83 constantly passes back and forth in close relation to but not engaging with the shouldered pin 80 of dog 78.

When, however, the sheet is brought into engagement with this dog 78, the latter is turned on its pivot-bearings and forced slightly outward, as shown in Fig. 14, into the line of travel of the reciprocating dog 81, with the result that as the latter in its downward stroke engages the pin of dog 78 the table-section will be tilted, as shown in dotted lines, Fig. 4, and the plate allowed to fall therefrom at one side onto a series of conveyer-belts 86, by which it is carried to one side of the delivery-table. Immediately upon the plate being so discharged dog 78 will resume its normal position, thereby allowing the table-section to return to its horizontal position under the action of weight 74, and the dog 81 may continue to swing up and down without contacting with the former until another sheet is ready to be discharged onto the conveyer. The sheet is then presented to an expander, whereby it is stretched or expanded laterally. The machine for accomplishing this forms the subject-matter of a concurrent application for patent this day executed by me.

I claim as my invention—

1. In a metal-expanding machine, a series of rotary feeders having tangentially-arranged grippers designed to engage a sheet of metal and draw the same to the feeders, as set forth.

2. In a metal-expanding-machine, a series of rotary feed-rolls, and a series of grippers mounted on said rolls and extended tangentially therefrom for engaging a sheet of metal in advance of the rolls and drawing it into engagement with the latter, substantially as set forth.

3. In a metal-expanding machine, a series of feed-rolls having each two spaced-apart disks, a series of gripper-fingers, pivotally hung between such disks, and springs for holding such fingers extended tangentially beyond the disks, as set forth.

4. In a metal-expanding machine, means for intermittently slitting a metal sheet, constantly-operated means for feeding the sheet to such slitting means, and means controlling such feeding means for preventing an over-feed of the sheet to the slitting means while the sheet is being slitted, as set forth.

5. In a metal-expanding machine, means for slitting a metal sheet, constantly-operated feed-rolls for feeding the sheet to such slitting means, and means for bodily moving such feed-rolls in opposition to the direction of the feed of the sheet while the slitting means is acting thereon, as set forth.

6. In a metal-expanding machine, means for slitting a metal sheet, constantly-operated feed-rolls for feeding the sheet to such slitting means, pivoted frames supporting the bearings for said feed-rolls, and means connected to said frames for bodily moving the feed-rolls and frames in opposition to the direction of the feed of the sheet while the slitting means is acting thereon, as set forth.

7. In a metal-expanding machine, means for slitting a metal sheet, constantly-operated feed-rolls for feeding the sheet to such slitting means, withdrawal-rolls for engaging the sheet beyond the slitting means, and means for bodily moving the feed-rolls and withdrawal-rolls in opposition to the direction of the feed of the sheet while the slitting means is acting thereon, as set forth.
8. In a metal-expanding machine, means for slitting a metal sheet, constantly-operated feed-rolls, constantly-operated withdrawal-rolls, frames for each set of rolls pivotally supported, connections between such frames, a constantly-operated cam, and an arm actuated thereby connected to one of said frames, said frames and rolls being bodily reciprocated during the action of the slitting means, as set forth.
9. In a metal-expanding machine, means for slitting a sheet comprising upper and lower dies arranged in series, and separating-blocks between the dies of each series, the blocks of one series being in line with the dies of the other series, said blocks having their edges beveled, as and for the purpose stated.
10. In a metal-expanding machine, means for slitting a sheet comprising upper and lower dies arranged in series, the dies of each series being spaced apart to accommodate the dies of the other series, and means between the dies of each series for preventing the sheet adhering thereto, as set forth.
11. In a metal-expanding machine, means for slitting a sheet comprising upper and lower dies arranged in series, the dies of each series being spaced apart to accommodate the dies of the other series, and stripper-plates extended between the dies of each series and supported at their ends, substantially as set forth.
12. In a metal-expanding machine, a table having an opening therein, upper and lower dies arranged in series, one of which is located within such opening of the table, the other series being movable into and out of such opening, the dies of each series being spaced apart, and stripper-bars extending across the opening and located in line with the spaces between the dies, substantially as set forth.
13. The combination with the table having an opening therein, of the lower series of dies, fitted in said opening, the upper vertically-movable series of dies, the dies of each series being spaced apart, those of one series alining with the intervening spaces of the other series, the upper and lower series of stripper-bars extended across such opening and arranged, respectively, in line with the intervening spaces of each series of dies, and the retaining-plates holding said stripper-bars, said plates being secured to the table adjacent to its opening, substantially as set forth.
14. The combination with the frame having a table formed with an opening therein, of the lower series of dies fitted in said opening, the upper series of dies in line therewith, the vertically-movable housing carrying said upper dies, means for operating the same, the dies of the two series being alternately arranged with intervening spaces, upper and lower series of stripper-bars in line, respectively, with the intervening spaces of each series of dies, said stripper-bars being beveled at their ends, and retaining-plates secured to the table on opposite sides of the opening and having beveled edges conforming to the ends of the stripper-bars, substantially as set forth.
15. In a metal-expanding machine, means for slitting a metal sheet comprising a stationary die and a movable die, means for moving such latter die, and means for distending the slitted portions of the sheet in opposite directions, comprising a stationary die and a movable die, and a connection between such latter die and the movable die of the slitting means, as set forth.
16. In a metal-expanding machine, means for distending the slitted sections of a metal sheet in opposite directions comprising two flat coacting dies, each of which is formed with alternating concaved portions and intermediate central projecting portions, each of such latter portions being concaved on each side of its center, as set forth.
17. In a metal-expanding machine, means for distending the slitted sections of a metal sheet in opposite directions comprising two coacting dies, each of which is formed with alternating transversely-extended concavities, and intermediate projecting portions between the concavities in line with the centers thereof, each of such portions being concaved to the sides of the dies, as set forth.
18. In a metal-expanding machine, means for slitting a metal sheet, means for distending the slitted portions of such sheet, constantly-operated feed-rolls for feeding the sheet to the slitting and distending means, constantly-operated withdrawal-rolls for acting on the sheet after it is distended, and means for bodily moving such feed-rolls and withdrawal-rolls in opposition to the direction of the passage of the sheet while the slitting and distending means are acting thereon, as set forth.
19. In a metal-expanding machine, means for slitting a metal sheet, means for distending the slitted sections in opposite directions, constantly-operated feed-rolls for feeding a sheet to both such means, constantly-operated withdrawal-rolls for acting on the sheet after it is distended, pivoted frames supporting the bearings for said feed-rolls and said withdrawal-rolls, connections between the two sets of frames, pivoted arms connected to one set of frames, and cams actuating such arms for moving the frames of both sets of rolls in opposition to the direction of passage of the sheet, substantially as set forth.
20. The combination with the delivery-table having a tilting section, of means for moving a sheet on such section, a dog carried by

the latter, a constantly-operated dog, said former dog being normally out of the line of movement of the constantly-operated dog and designed to be engaged thereby when moved
5 into the line of travel thereof by a metal sheet engaging therewith, as set forth.

21. The combination with the table-frame, and a rock-shaft mounted thereon, of a supporting-section secured to such rock-shaft, an
10 arm on the latter, a dog depending from said arm, a second arm loose on said shaft, means for constantly reciprocating said second arm, a dog carried by the latter, said first-mentioned dog being normally out of line of the
15 travel of the constantly-reciprocated dog, and means for moving a sheet on said table-section into engagement with the first-mentioned dog, whereby the latter is swung into the line of travel of the constantly-reciprocated dog,
20 as set forth.

22. In a metal-expanding machine, the combination with the feed-rolls, means for slit-

ting a metal sheet, means for distending the slitted sections, and the withdrawal-rolls, of the delivery-table onto which the sheet is fed
25 by said withdrawal-rolls, a rock-shaft, a tilting section secured to said rock-shaft, feed-rolls near one end of such section, a dog fast on said shaft, an arm loose on said shaft, a second dog carried thereby, means for constantly re-
30 ciprocating said arm and dog, the first-mentioned dog being normally out of the line of movement of the second dog and designed to be engaged thereby to effect the tilting of the table-section when engaged by the sheet on
35 the latter, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GUSTAV J. HOLL.

Witnesses:

W. G. KENAGA,
M. E. KEPLINGER.