

No. 725,453.

PATENTED APR. 14, 1903.

M. D. KNOWLTON.
MACHINE FOR SCORING CARDBOARD.

APPLICATION FILED OCT. 11, 1899.

NO MODEL.

8 SHEETS—SHEET 1.

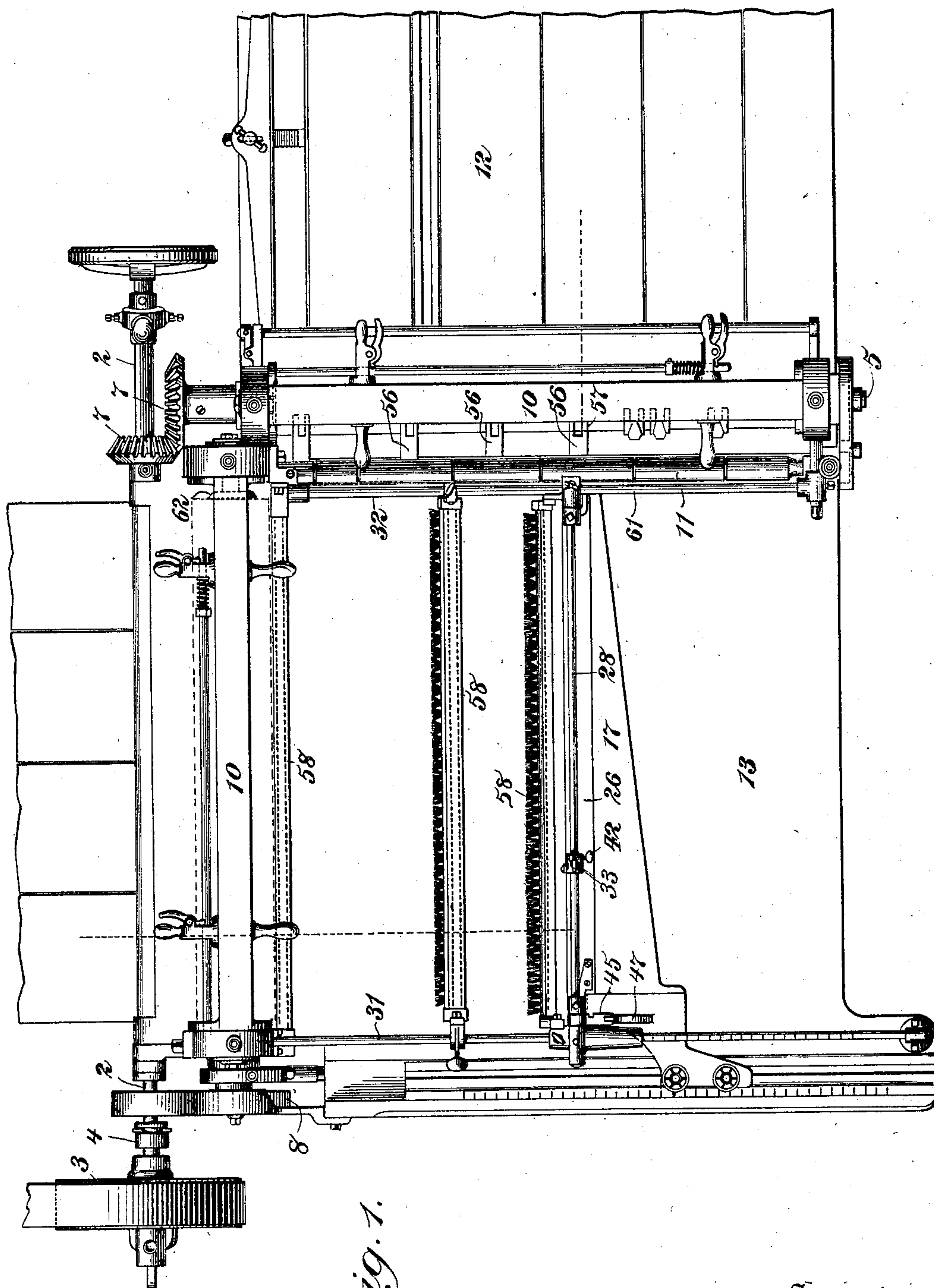


Fig. 1.

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By his Attorney
Charles F. Dane

No. 725,453.

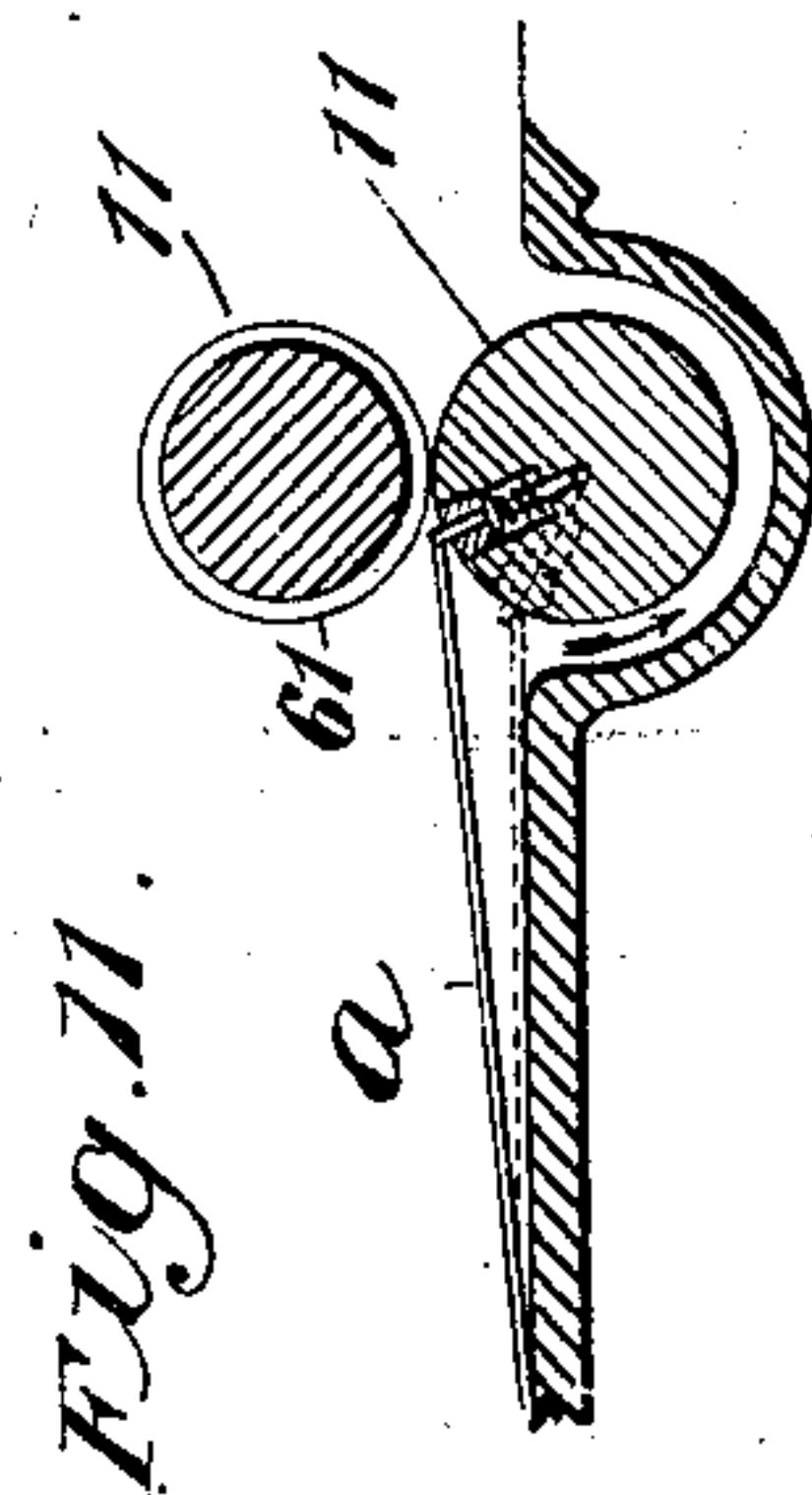
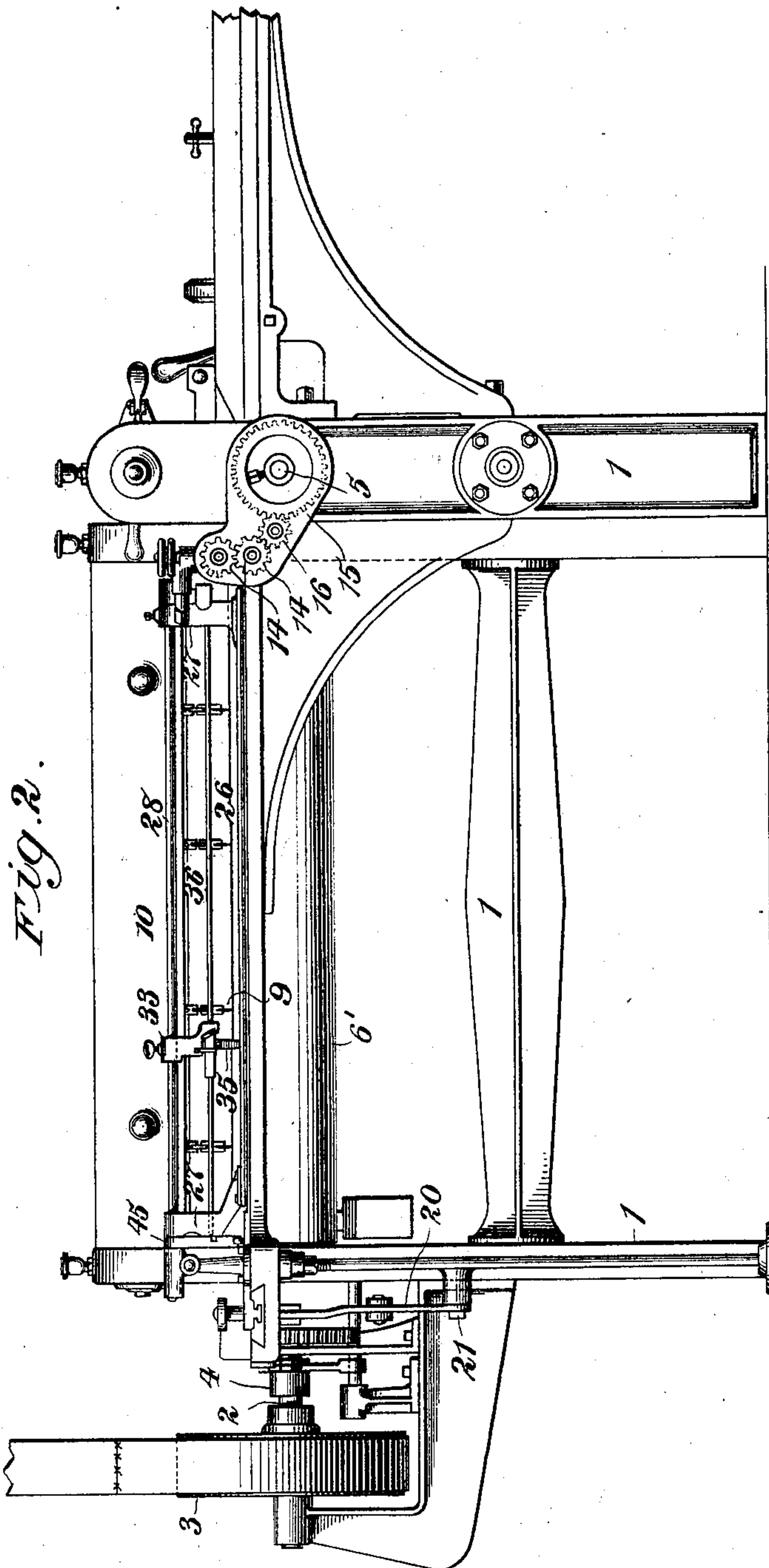
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8 SHEETS—SHEET 2.



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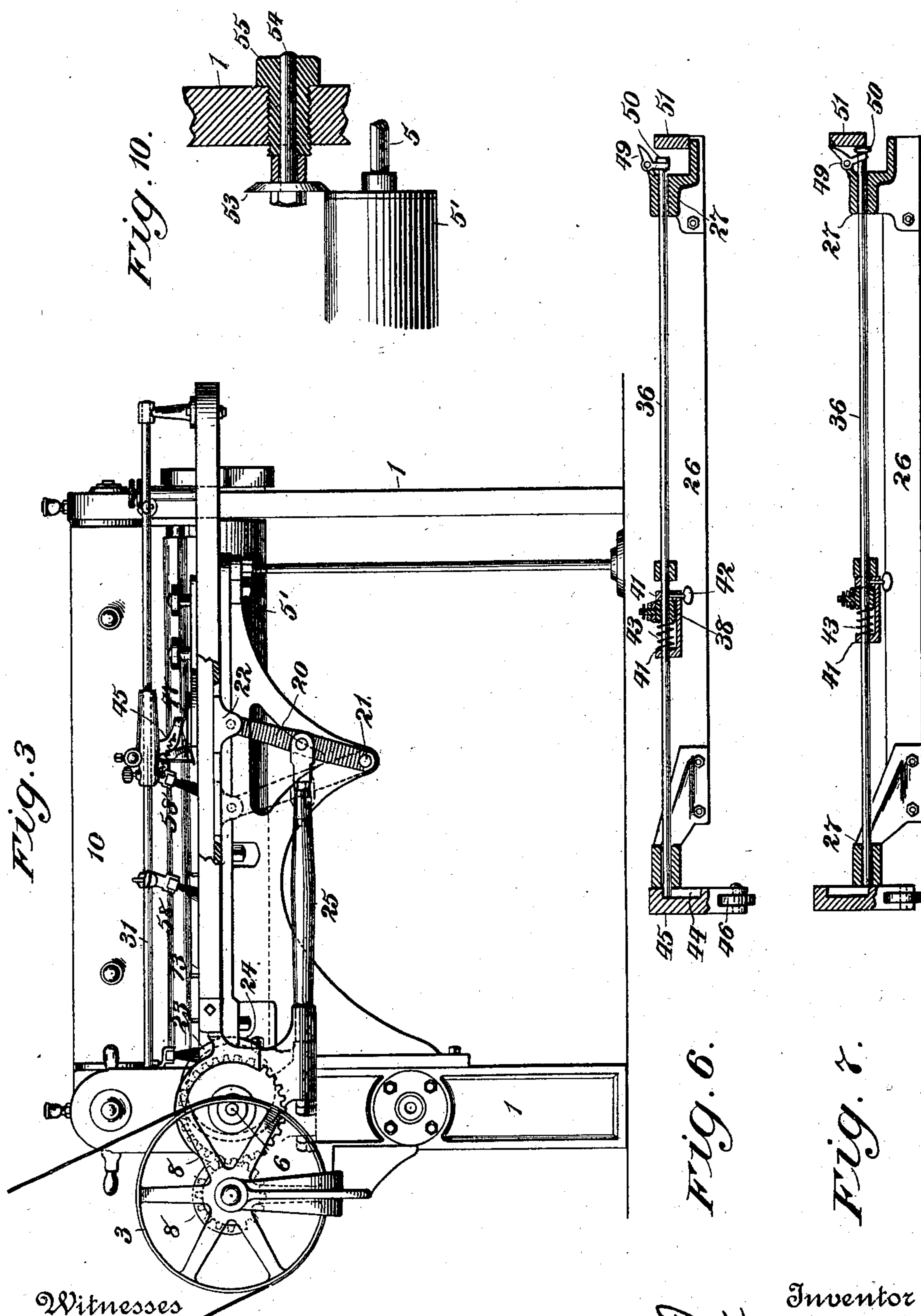
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8 SHEETS—SHEET 3.



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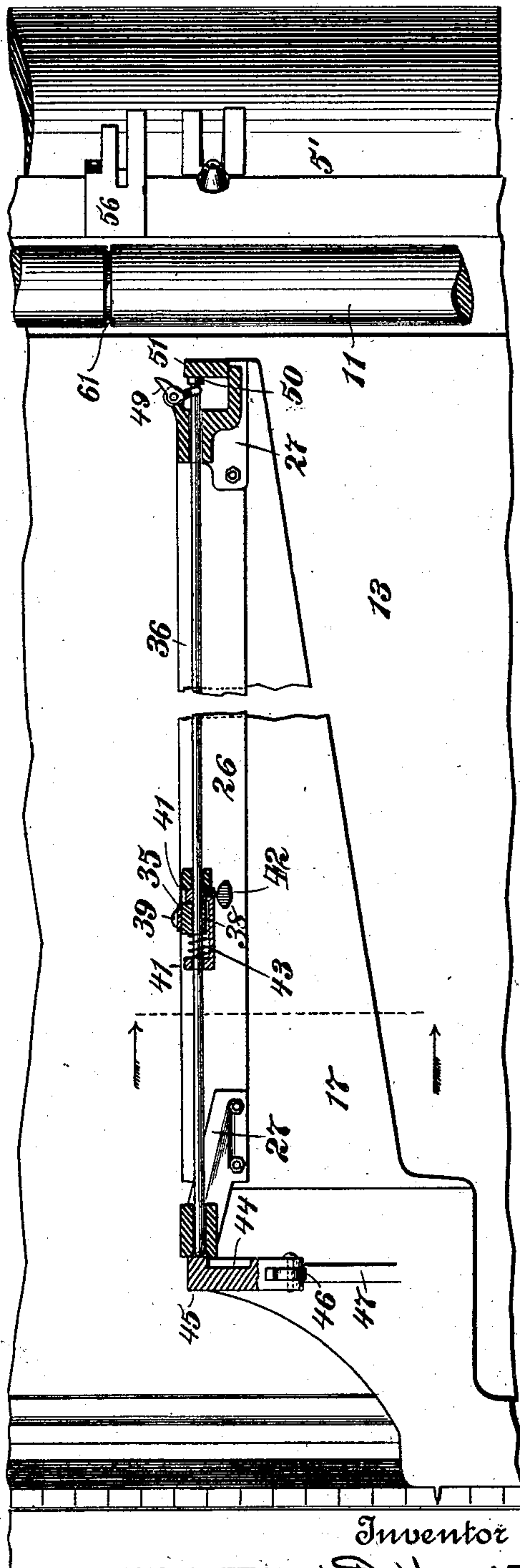
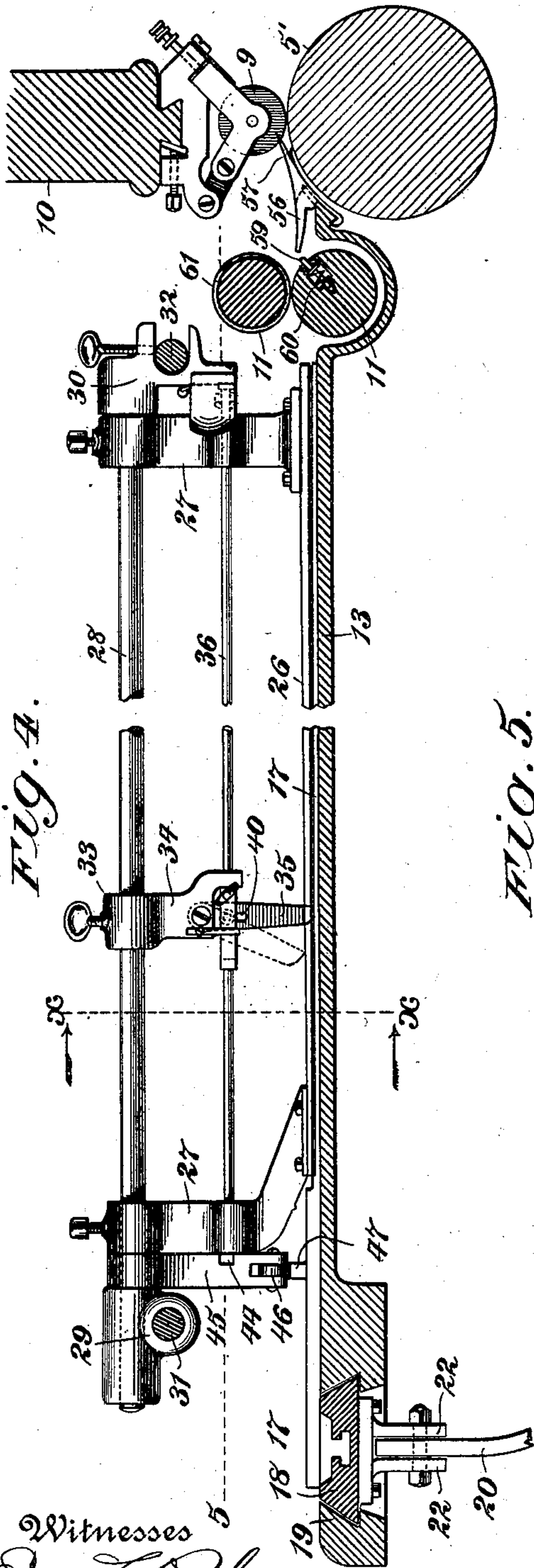
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8 SHEETS—SHEET 4.



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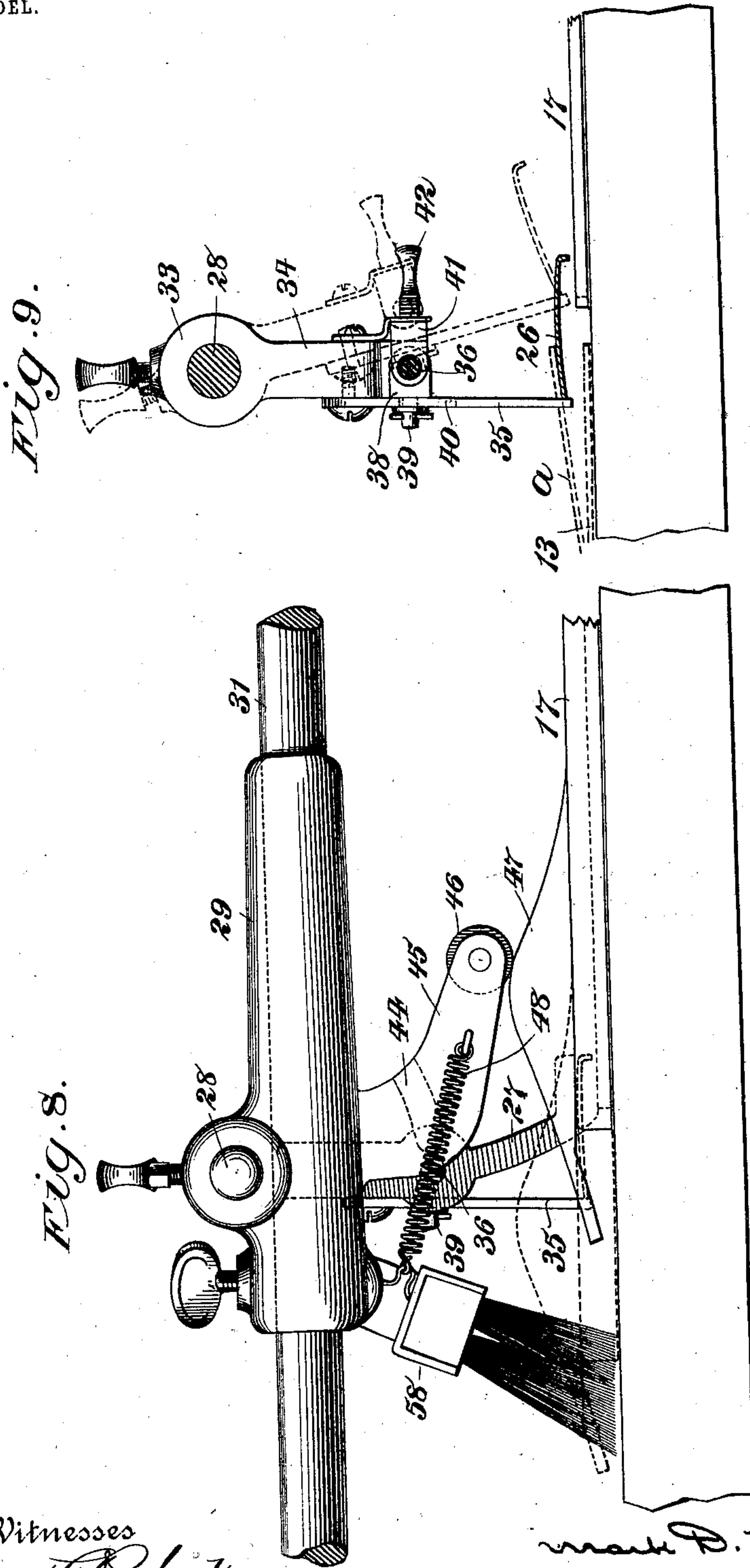
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8 SHEETS—SHEET 5.

NO MODEL.



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NO MODEL.

8 SHEETS—SHEET 6.

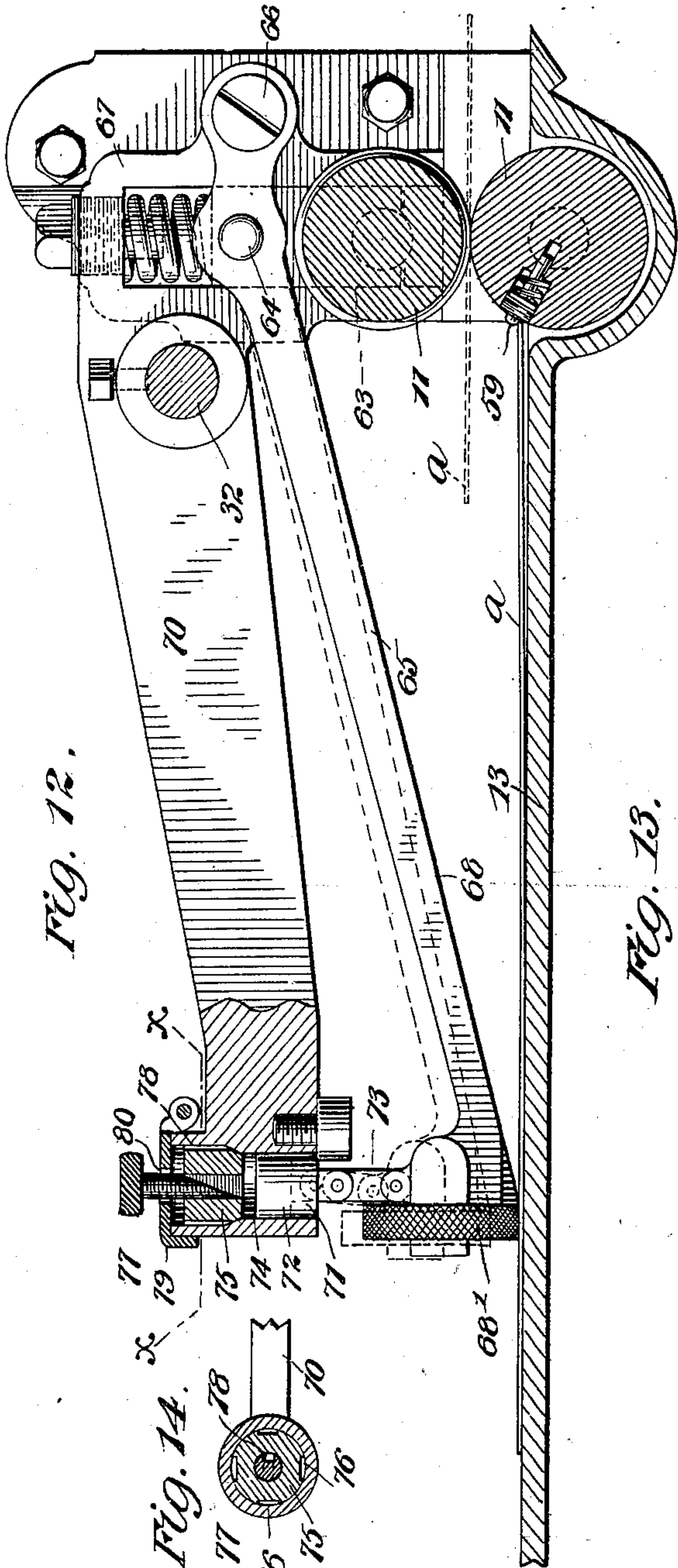
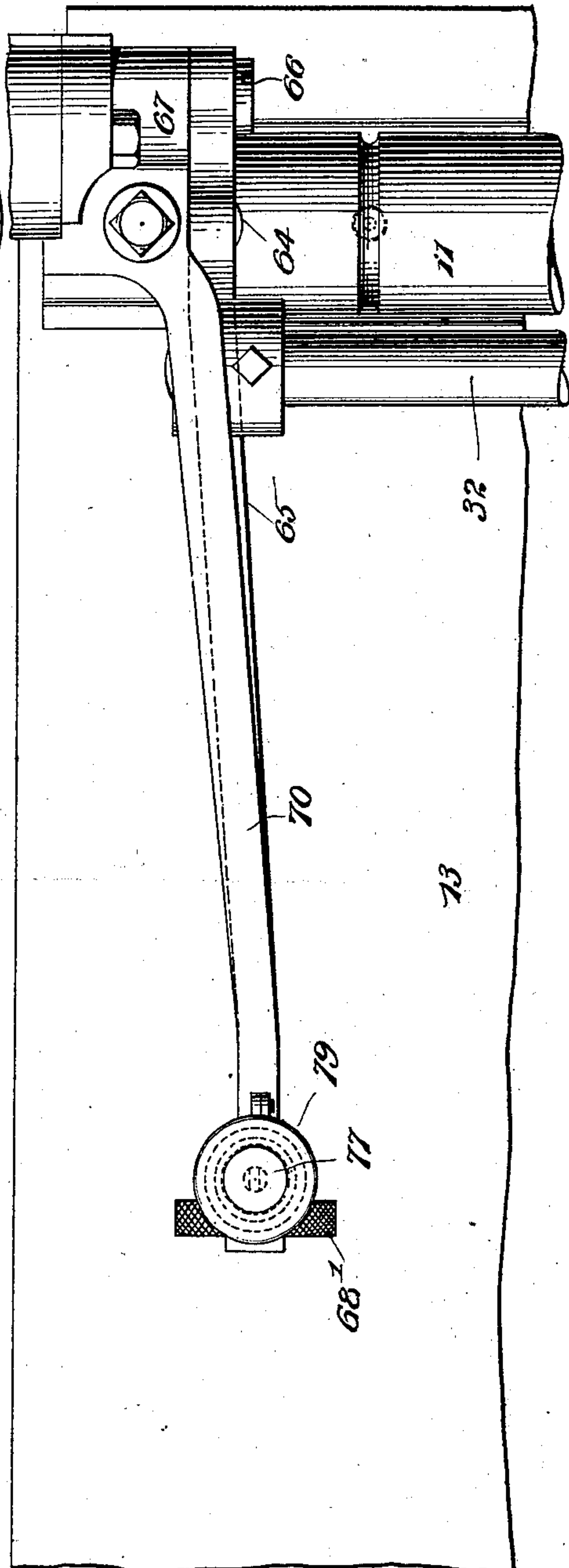


Fig. 13.



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8 SHEETS—SHEET 7.

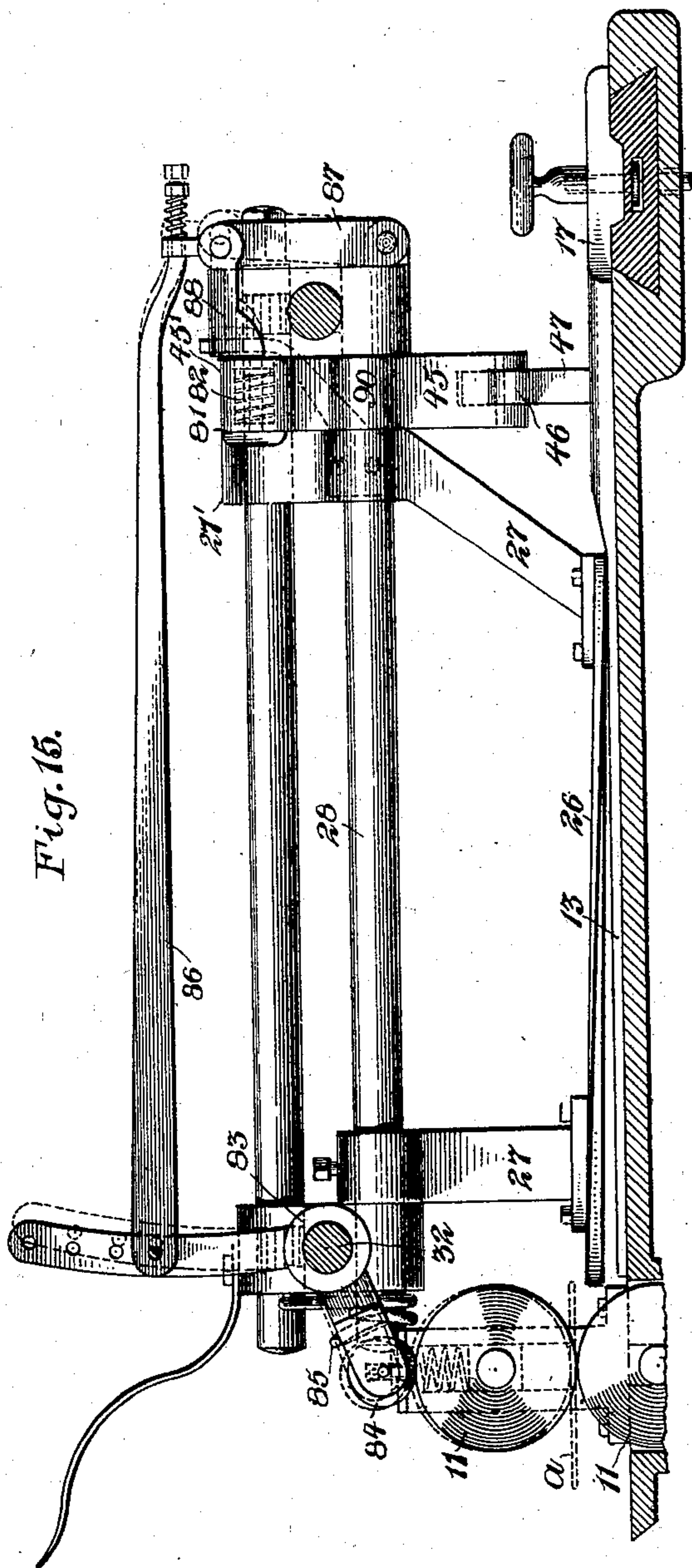


Fig. 15.

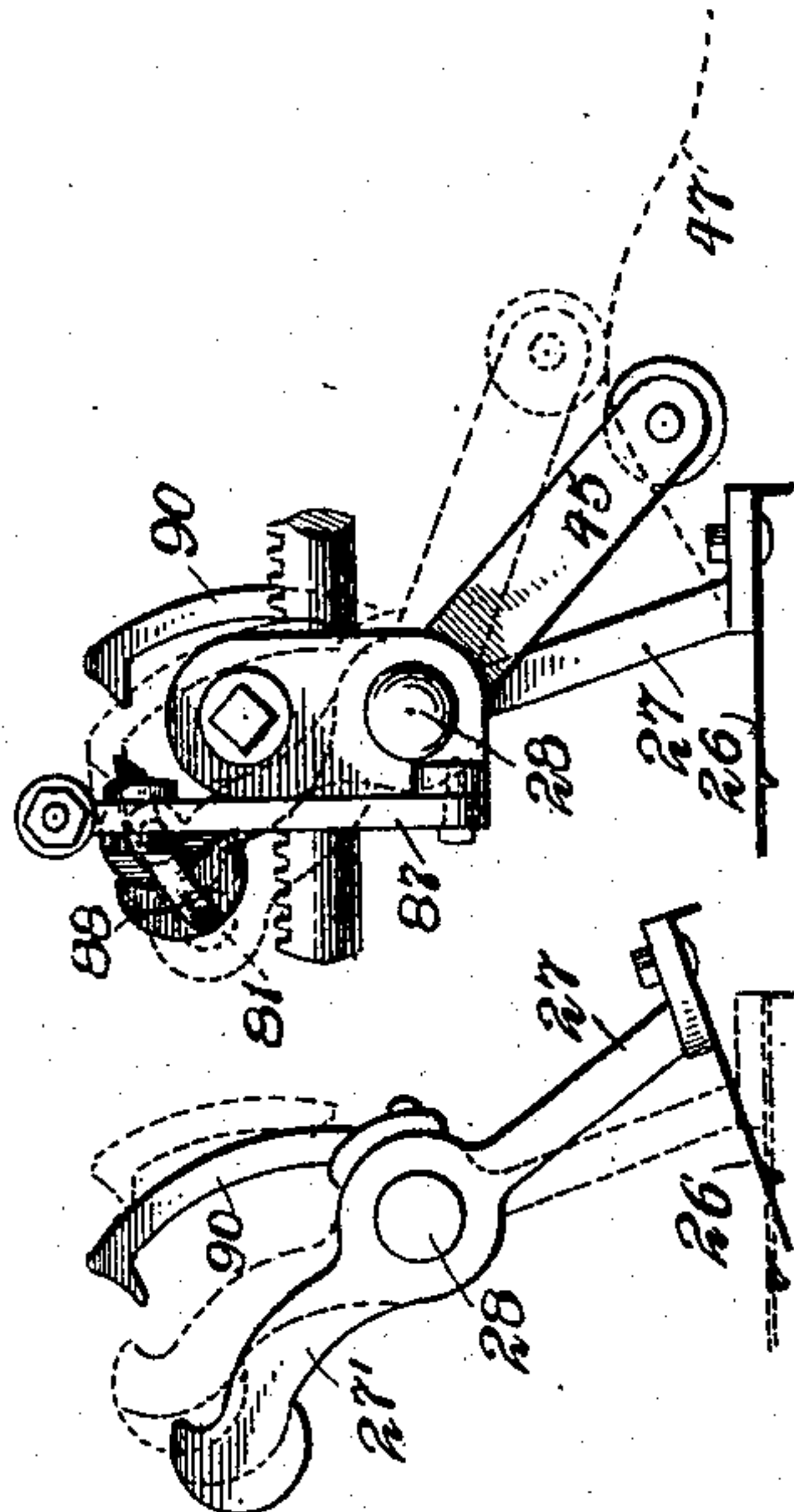


Fig. 19.

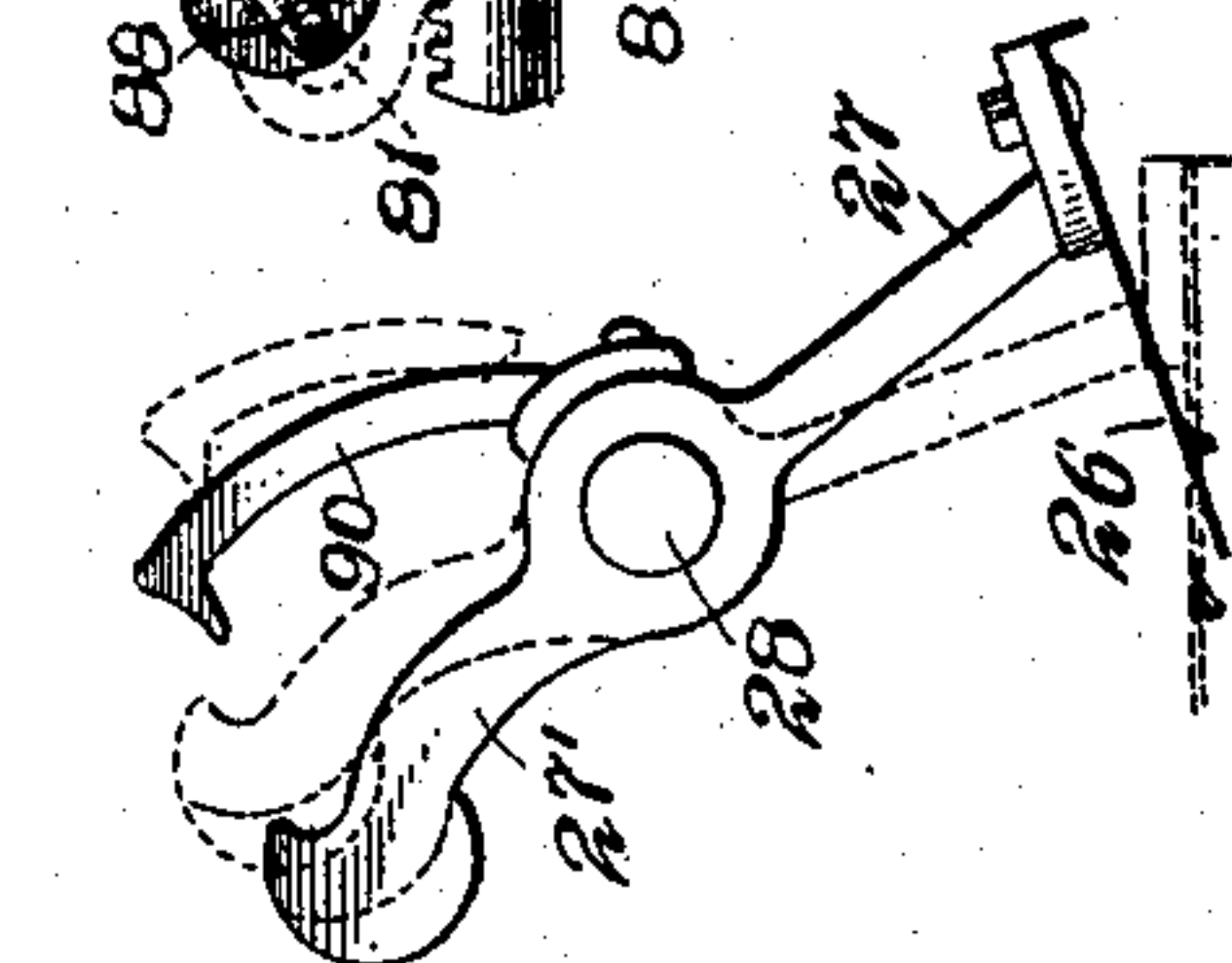


Fig. 18.

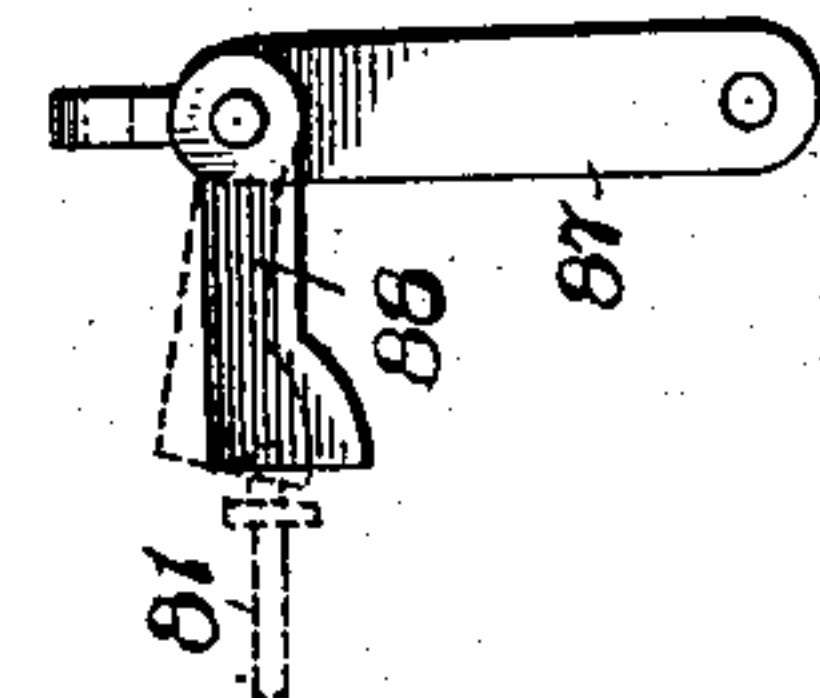


Fig. 16.

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8 SHEETS—SHEET 8.

Fig. 17.

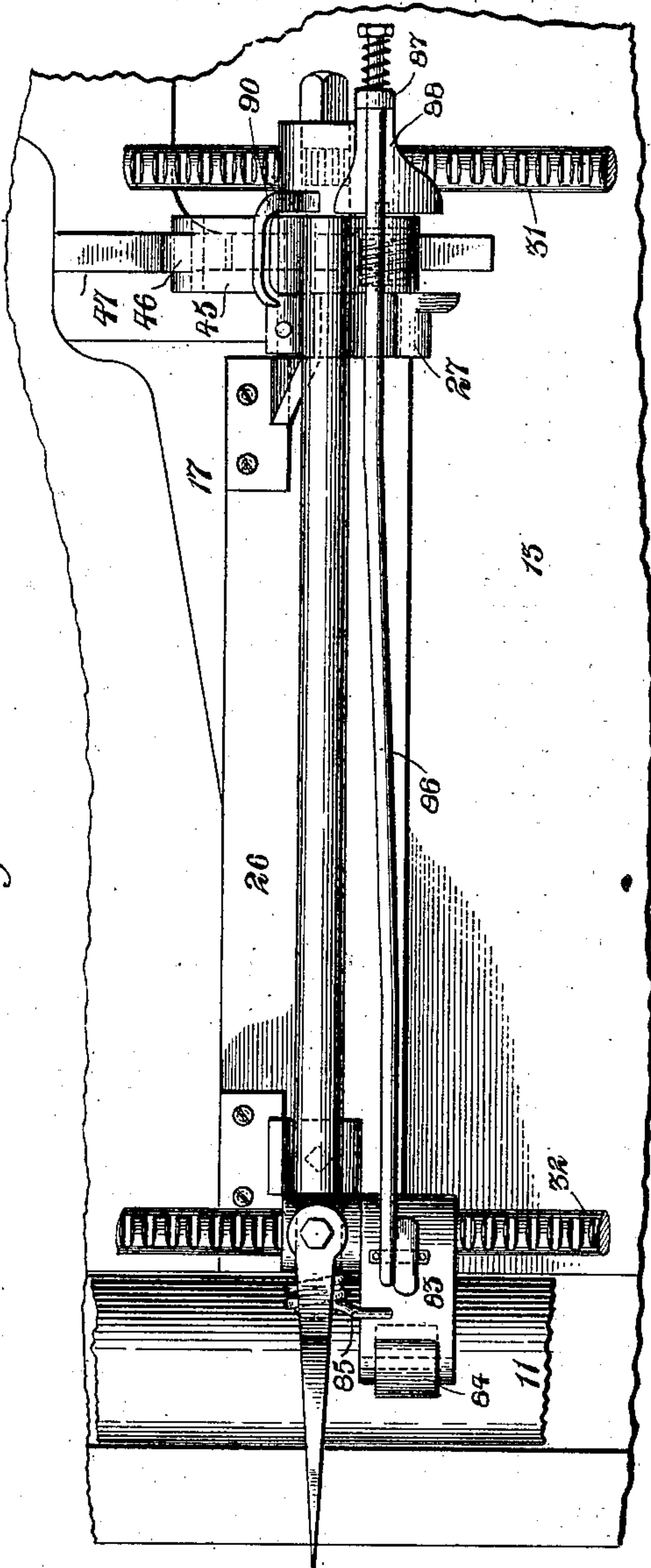


Fig. 22.

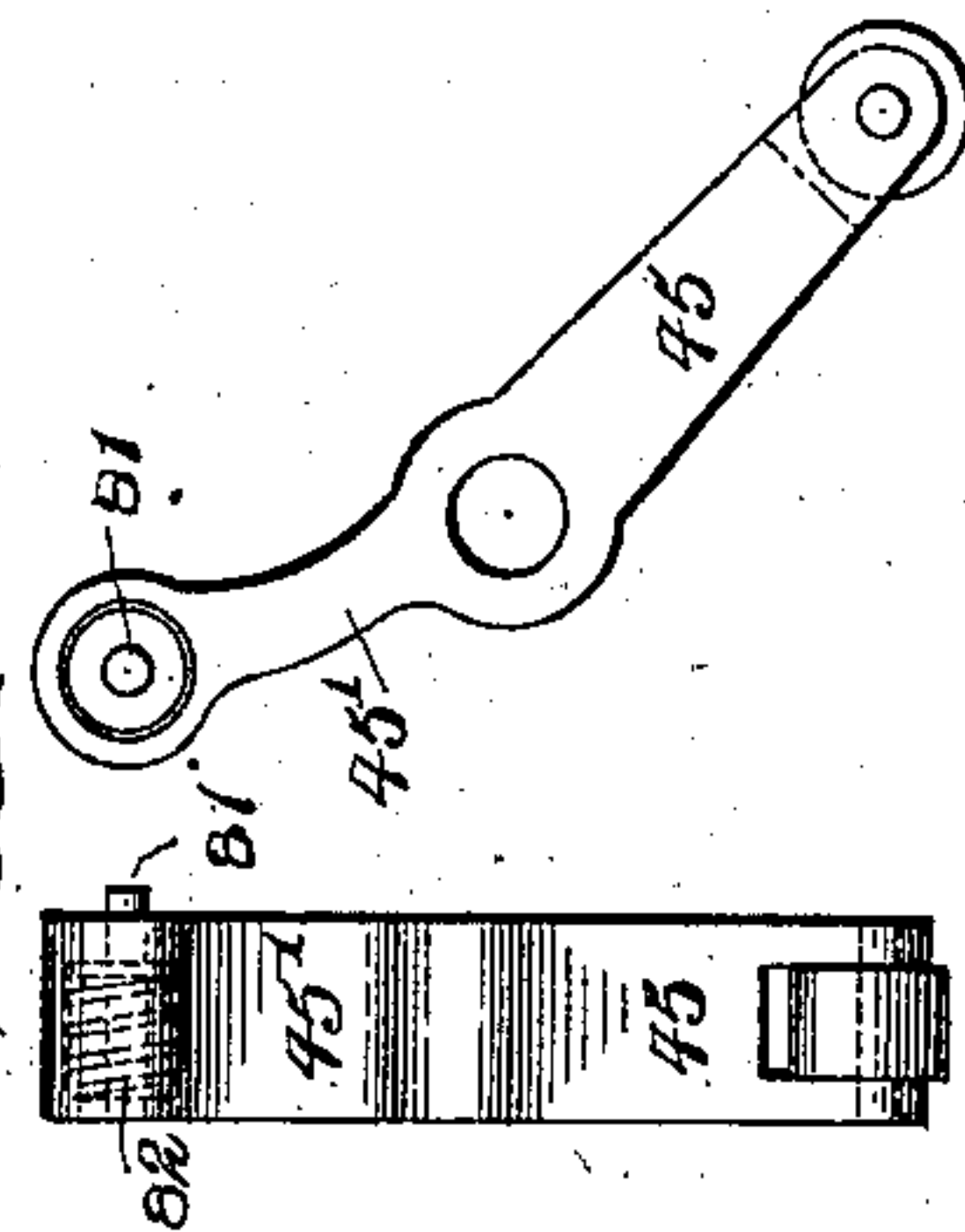
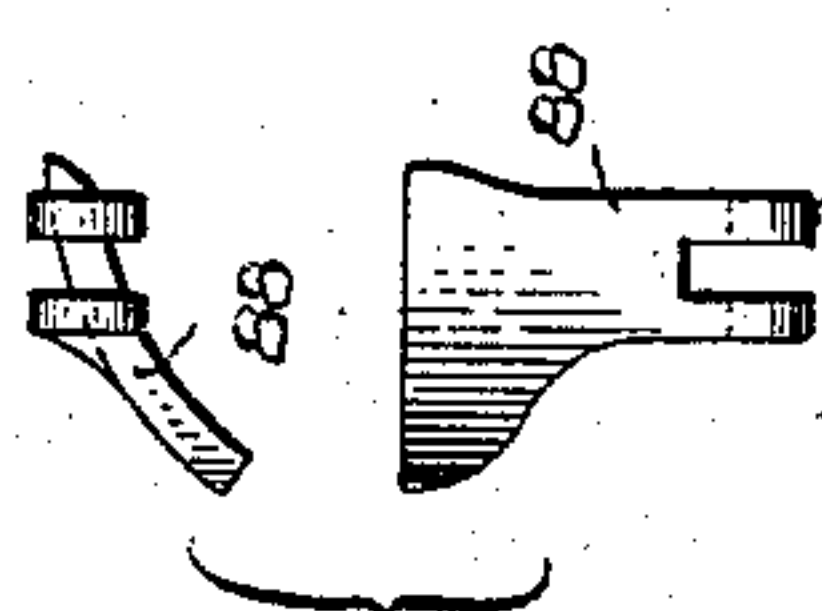


Fig. 21.



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UNITED STATES PATENT OFFICE.

MARK D. KNOWLTON, OF ROCHESTER, NEW YORK.

MACHINE FOR SCORING CARDBOARD.

SPECIFICATION forming part of Letters Patent No. 725,453, dated April 14, 1903.

Application filed October 11, 1899. Serial No. 733,315. (No model.)

To all whom it may concern:

Be it known that I, MARK D. KNOWLTON, a citizen of the United States, and a resident of Rochester, Monroe county, State of New York, have invented certain new and useful Improvements in Machines for Scoring Cardboard, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

My invention relates more particularly to that class of scoring machines or apparatus adapted for double-scoring cardboard or similar material and which are provided with two sets of scorers or scoring mechanism arranged to score the cardboard in two directions (usually at right angles to each other) during a single passage of the same through the machine, a suitable feeding device being arranged between the two sets of scorers for engaging with the board after it has been operated upon by the first or primary scorers and automatically feeding it to the next or secondary scorers. In the operation of these machines the sheets of cardboard or other material are fed one at a time, usually by an attendant, to the primary scorers and after having been passed from the latter are each engaged by a reciprocating cross-feed operating at right angles to the path of movement of the sheet as it passes from the said primary scorers and fed thereby to the next or secondary scorers. In feeding the sheets rapidly and in close succession through the machine, however, two or more of the sheets are liable to become fouled unless considerable care is exercised on the part of the attendant in regulating the manual feed to the primary scorers or some other provision made to avoid the same.

Therefore it has been the object of my present invention to provide a simple and effective means for automatically controlling the passage of the sheets through the machine, whereby possibility of interference between two successive sheets is avoided.

In carrying my invention into effect I employ a cross-feed for operating upon the table between the primary and secondary sets of scorers having a continuously-reciprocating movement and above the path of such cross-feed suspend a swinging guard plate or shelf, which is arranged parallel with the forward

or sheet-engaging edge of the latter. This guard-plate receives thereon that edge of the sheet nearest the cross-feed as the sheet passes from the primary scorers upon the table between the two sets of scorers and holds the same above the path of the reciprocating feed, so that it will not be engaged and moved thereby until the preceding sheet has been fed to the secondary scorers and the cross-feed has returned to its normal or starting position, at which time the said guard-plate, operated by suitable mechanism brought into action by the return of the cross-feed, is swung backward, so as to permit the supported edge of the sheet to drop upon the table and into the path of the cross-feed to be engaged by the latter and fed forward thereby to the secondary scorers. Such construction and operation of parts, whereby one sheet is prevented from being acted upon by the reciprocating cross-feed until the latter has moved forward to feed the preceding sheet to the secondary scorers and returned to its starting position, prevents possibility of fouling or interference between two successive sheets. The guard-plate normally hangs in a stationary position independent of connection with its backwardly-swinging mechanism, so as to be in position to receive the edge of the sheet thereon as the latter passes from the primary scorers, the backward movement of the guard-plate from beneath the edge of the sheet being controlled by the forward movement of the latter in passing from the primary scorers, a controller being arranged in the path of the advancing sheet to be engaged by its forward edge and operated thereby to bring into action certain mechanism whereby the guard-plate will be swung backward from beneath the supported edge of the sheet at the return movement of the cross-feed, as before referred to. As the guard-plate is moved back from beneath the edge of the sheet to permit the latter to drop into the path of the cross-feed further means is thereby brought into action to cause the quick return of the guard-plate to its normal position to receive the edge of the succeeding sheet entered through the primary scorers.

The features above referred to and various others forming part of my invention will be

hereinafter referred to in detail, and pointed out in the claims.

Referring to the drawings, Figure 1 is a plan view of a scoring-machine embodying my invention with two of the tables partly broken away. Fig. 2 is an elevation of the machine looking toward the front of the same as shown in Fig. 1. Fig. 3 is an elevation of the machine looking toward the right of the same as shown in Fig. 1. Fig. 4 is an enlarged detail view in elevation of the cross-feed and sheet-controlling mechanism, also showing in section the primary scorers, feed-rolls, and table. Fig. 5 is a partial plan view of the same with the parts in section through line 5 5 of Fig. 4. Figs. 6 and 7 are detail views, partly in section, showing the action of certain parts of the sheet-feed-controlling mechanism. Fig. 8 is an enlarged detail view, partly broken away, showing the end of the sheet-feed-controlling mechanism as viewed from the left in Fig. 4. Fig. 9 is an enlarged vertical cross-section taken through line *x x* of Fig. 4 looking toward the right. Fig. 10 is an enlarged detail view, partly broken away and in section, showing one of the trimming-knives coacting with the end of the bed-roll. Fig. 11 is a detail view illustrating the action of one of the sheet-feeding devices. Fig. 12 is an enlarged detail view in elevation and section, illustrating a construction for controlling the movement of a sheet when fed onto the table from the primary scorers. Fig. 13 is a plan view of the construction shown in Fig. 12. Fig. 14 is a section through line *x x* of Fig. 12. Fig. 15 is an enlarged detail view in elevation and section, illustrating a modified form of sheet-controlling mechanism, to be described. Fig. 16 is an end or side elevation of certain of the parts shown in Fig. 15, the same being partly broken away and in section. Fig. 17 is a plan view of the construction shown in Fig. 15. Figs. 18 to 20, inclusive, are details of certain of the parts shown in Figs. 15 and 17, showing different positions assumed by the same at different times in the operation of the machine. Figs. 21 and 22 are also details of certain of the parts shown in Fig. 15 and in certain of the following figures.

To explain in detail, 1 represents the supporting-frame, which may be of any suitable form or construction, upon which the several working parts of the machine are supported. Adjacent to one end of the frame and supported in suitable bearings therein is the main driving-shaft 2, which latter, as shown, is provided with a pulley 3, running loosely thereon and adapted to be connected or disconnected therewith by a suitable clutch 4. Two shafts 5 and 6, arranged at right angles to each other and each being provided with a bed-roll thereon, forming part of the primary and secondary scoring mechanisms, respectively, are driven from the said driving-shaft 2 through the medium of suitable connections, the shaft 5, as shown, being driven through

the bevel-gears 7 7 and the shaft 6 through the gears 8 8. Any suitable means, however, for operating the shafts 5 and 6 other than that shown and described may be employed, as found to be most convenient and desirable. The two scoring mechanisms, of which the bed-rolls 5' and 6' form part, are of usual construction, the same consisting of the said bed-rolls and the scoring knives or cutters 9, adapted to coöperate therewith, the knives or cutters being carried in a detachable and adjustable position on the under side of two swinging bars 10 10, which are journaled in suitable bearings on the supporting-frame in position immediately above the bed-rolls.

At the rear of the primary scorers and adjacent thereto are located two feed-rolls 11 11, which are supported at their opposite ends in suitable bearings and adapted to engage with the leading edge of a sheet as it is fed by an attendant from the feed-table 12 through the primary scorers and move the same through the latter and upon the table 13 between the two sets of scorers. These feed-rolls are connected at one end by gears 14 14 (see Fig. 2) and driven from the shaft 5 through the medium of gearing 15 and 16.

After the scored sheet has been fed onto the table 13 it is engaged at the proper time by the reciprocating cross-feed operating in a direction at right angles to the path of movement of the sheet as it passes from the primary scorers and moved or fed thereby to the secondary scorers to be scored by the latter in a direction at right angles to the first score-lines. This cross-feed, which may be constructed and operated in any usual and well-known manner, consists of the blade 17, which rests and slides upon the table 13 and is adjustably connected at one end with a reciprocating cross-head 18, which latter is fitted to slide within a groove 19, formed in the table 13 adjacent to its outer edge. A link 20, pivotally connected at one end with the supporting-frame at 21 and at its opposite end having a loose connection with the said cross-head between two ears 22 22 on its under side, is operated from an eccentric 23 on the bed-roll shaft 6 through the medium of suitable connections to receive a vibrating movement, and thereby communicate to the cross-head 18 its reciprocating movement, the connections between the said eccentric and link being an eccentric-strap 24 and a rod 25, connected at one end with said strap and at its opposite end with the link 20, as clearly shown in Fig. 3. As the sheet is fed onto the intermediate table 13 from the primary scorers that edge nearest the cross-feed 17 is received upon the guard-plate 26, which is arranged parallel with the forward or sheet-engaging edge of the cross-feed and supported thereby above the path of the latter, so as not to be engaged by the same until a certain predetermined time, at which time the guard-plate is automatically swung backward to permit the supported edge of the sheet to

drop upon the table and into the path of the cross-feed by means as will be described.

The guard-plate 26 is supported by two arms 27 27 just a sufficient distance above the table to permit of the free clearance of the reciprocating cross-feed thereunder, the said arms being pivotally supported upon a rod 28, (see Fig. 4,) which is arranged above the table 13 and seated at its opposite ends within bosses formed on two collars or sleeves, (indicated at 29 and 30,) which latter are supported in a sliding adjustable position upon two cross-rods 31 and 32, suitably supported above the table near its opposite edges. Upon the rod 28 between the two guard-plate-supporting arms 27 27 is loosely supported a sleeve or collar 33, having a downwardly-extending bracket-arm 34, from which latter is pivotally suspended a finger 35, the lower end of which hangs slightly below the upper surface of the guard-plate at the forward edge thereof, as more clearly shown in Figs. 4, 8, and 9, so as to lie in the path of the leading edge of a sheet being fed onto the table 13 and be engaged thereby. A rod 36, loosely extending through an opening in the lower end of the bracket-arm 34 and being supported at its ends within openings in the opposite guard-plate-supporting arms 27 27, so as to be capable of having a sliding longitudinal movement therein, is provided with a loose collar 38 thereon at a point opposite the finger 35, having a pin 39 loosely extending through a vertically-elongated slot 40 in said finger, as more clearly shown in Figs. 4 and 9. Longitudinal movement of this collar 38 on the rod 36 as given by the action of the connected controller-finger 35 is limited between two connected rings 41 41, which latter are held in an adjustable stationary position on said rod by a set-screw 42. Between one of the said rings 41 and the rear end of the collar 38 is located a light coiled spring 43. By means of such described connection between the longitudinally-movable rod 36 and the pivotally-suspended controller-finger 35 when the latter is engaged by the leading edge of the sheet being fed onto the table 13 (which engagement occurs about as the sheet clears the primary scorers) it is moved by such sheet, as indicated by dotted lines in Fig. 4, and in so moving has moved the yieldingly-connected rod 36 and caused one end of the same to project beyond the edge of its supporting-arm 27 and enter a slot or groove 44 in a constantly-vibrating lever 45, in which groove it is engaged by the end wall thereof and carried backward to swing the guard-plate from beneath the edge of the supported sheet and permit the latter to drop into the path of the cross-feed, as shown in Fig. 9. In this latter figure one edge of a sheet (indicated at and shown in dotted lines) is represented as resting upon the guard-plate, with the controlling-finger in the path of the same and the position of the parts as taken upon

their backward throw or movement shown in dotted lines.

The lever 45 is pivotally suspended from the supporting-rod 28 adjacent to one of the arms 27 and at its lower end is provided with an antifriction-roll 46, which rides upon a cam or pattern surface 47, located on the reciprocating cross-feed 17, the action of which cam communicates a constantly-vibrating movement to said lever. The roll 46 is held in operative contact with the cam by means of a connecting-spring 48.

The backward throw of the guard-plate from beneath the supported edge of the sheet is so timed as to take place upon the return movement of the cross-feed after pushing the preceding sheet to the secondary scorers and after its forward edge has moved back from beneath the edge of the sheet resting on the guard-plate, as shown in Fig. 9. Upon such return movement of the cross-feed the cam-surface 47 thereon engaging with the lever 45 causes a positive backward throw of the same and (in the event of connection being made between the parts) the connected guard-plate.

As the guard-plate-actuating lever 45 has a constantly-vibrating movement, it may happen that its groove 44 will not be opposite or in a position to receive therein the end of the rod 36 when the latter is first acted upon in a longitudinal direction by the passage of a sheet under the controller-finger 35. For such reason the yielding connection between the finger and rod, as described, is provided. In the event of the lever being in position with its groove forward of the end of the rod, as shown in Fig. 5, when a sheet passes under the finger 35 and moves the same, as described, the connected collar 38 is moved longitudinally on the rod 36, and thereby compresses the spring 43 between the same and the adjacent ring 41, causing it to act upon the latter and hold the end of the rod with a yielding pressure against the adjacent face of the lever 45, whereby when the groove in the latter is brought to a position opposite the same the end of the rod will snap therein, as shown in Fig. 6. The bracket 34, with the supported controller-finger 35 and the several connections of the latter on the rod 36, are adjustable back and forth on their respective supporting-rods in order that they may be adjusted in position according to the size of the sheets to be fed through the machine, it being understood that the finger should be so located as to receive the edge of the sheet by which it is operated thereunder.

In order to secure the quick return of the guard-plate and connecting parts to their normal operative position after the guard-plate has been swung backward from beneath a supported sheet, so as to be ready for the next sheet fed from the primary scorers, I have pivoted a small elbow-lever 49 upon one of the guard-plate-carrying arms 27, as shown

in Figs. 5, 6, and 7, one arm of which is bifurcated and embraces the rod 36 to engage with a head or button 50 on the end of the latter, while the other arm extends into a position to engage upon the backward swing of the guard-plate with a stationary arm 51 on the collar 30, so as to cause the lever to swing on its fulcrum, and thereby move the rod 36 longitudinally to withdraw its end from the groove 44 in the lever 45, and so permit the guard-plate to swing back to its normal position. The said elbow-lever 49 is operated as follows: When the guard-plate is in its normal position, the several connecting parts assume the positions indicated in Fig. 5; but when the rod 36 is moved longitudinally by the passage of a sheet under the controller-finger 35 and one end thereof entered into the groove 44 in the lever 45 such movement of the rod causes the head 50 at its opposite end to engage the elbow-lever 49 and swing its free arm into position to engage with the edge of the stationary arm 51, as shown in Fig. 6. Now as the guard-plate is swung backward by the action of the lever 45 the said free arm of the elbow-lever, after the guard-plate has been swung backward a sufficient distance to permit the supported edge of the sheet to drop upon the table, is brought into contact with the arm 51 and operated thereby to move the rod 36 longitudinally and withdraw its opposite end from the groove 44 in the lever 45, as shown in Fig. 7, after which the parts again swing back to their normal position. (Shown in Fig. 5.)

As the sheet is fed through the primary scorers each of its longitudinal edges is trimmed by suitable trimming-cutters, one of such cutters being one of the usual laterally-adjustable scoring-knives, as shown in Fig. 4, which is set in proper cutting relation to the bed-roll 5', and the other formed by a rotary cutter-disk 53, coöperating with the end of the said bed-roll 5', as shown in detail in Fig. 10. The cutter-disk 53, as shown, is mounted upon a pin 54, which is seated within a sleeve 55, having an adjustable screw-threaded connection with the supporting-frame. By turning this sleeve backward or forward in the frame the position of the cutter-disk may be adjusted relative to the co-acting edge of the bed-roll to allow for any wear of the parts, &c. Any suitable means, however, for supporting the cutter-disk other than that shown and described may be employed or one of the usual scoring-knives be used in lieu of the same, if so desired.

The leading edge of the sheet is guided and supported in passing from the bed-roll 5' of the primary scorers to the feed-rolls 11 upon a series of guide plates or devices 56, which have a sliding dovetailed connection with the forward edge of the table 13 at a point between the said bed-roll and feed-rolls, as shown in Fig. 4. These plates are provided with tapering fingers, the ends of which lie in near relation to the upper sur-

face of the bed-roll, so as to insure the front edge of the sheets passing thereover. In order that the trimmed or severed portions of the sheets, however, may be directed beneath the table immediately after being operated upon by the cutters and so be out of the way in the further operation of the machine upon the main sheet, those guide-plates adjacent to the cutters are each formed with one of its fingers (indicated at 57) raised above the surface of the bed-roll and close to the outside of the cutters, so as to receive thereunder the severed strips or pieces and direct the same below the table, as will be clearly understood by reference to Fig. 4.

As a sheet is fed from the primary scorers onto the table 13 it passes over the reciprocating cross-feed, which is operating at such time to push the preceding sheet forward to the secondary scorers. In order, therefore, to prevent the sheet being moved from its proper course by said cross-feed and insure its being directed and yieldingly held in position on the table to be properly engaged by the cross-feed after the guard-plate has been swung backward from beneath its raised edge, I have supported suitable downholds above the table, which permit the free movement of the cross-feed and sheets thereunder, but bear with a yielding pressure upon the sheet to prevent movement of the same other than that provided for. The downholds, as shown, consist of the brushes 58, which extend across the table 13 in a direction at right angles to the feed-rolls 11 and are suitably connected at their opposite ends with the cross-rods 31 and 32, so as to have a sliding adjustable connection therewith. Any suitable form of downhold, however, for the purpose intended other than that shown and described may be employed without departure from the invention.

It is of course understood that as the sheet is fed from the primary scorers it should be brought to a standstill upon the table 13 in position to be properly presented to the secondary scorers when fed thereto by the cross-feed. To accomplish this, I have provided the lower feed-roll 11 with a series of projecting pins 59, (only one of which is shown in the drawings,) arranged in a straight row lengthwise of the roll, which are adapted to engage with the rear edge of the sheet after being passed between the rolls and positively push the sheet forward upon the table until the pins are carried below the plane of the latter. This insures the sheet being positively located in the proper position on the table, as the downholds bearing upon the sheet produce sufficient friction thereon to hold the same from further movement after being released from the engagement of said pins.

The pins 59 are seated within openings in the feed-roll and supported by means of a coiled spring 60, acting upon the same with their ends yieldingly projecting beyond the

surface of the roll, so as to yield when brought into contact with the under side of a sheet passing between the two rolls without causing damage thereto. As the rear edge of the sheet passes from between the rolls it then comes to an immediate stop (shown in Fig. 11) on account of the friction produced by the downholds. In order, therefore, to insure the pins positively engaging with the rear edge of the sheet after passing from between the rolls, I have provided the upper feed-roll with annular grooves 61, into which the projecting ends of the pins enter when brought opposite the same, so as to span the space between the rolls, and thus be caused to positively engage the rear edge of the sheet, as shown in Fig. 11. The sheet after being so engaged by the said pins is fed forward thereby to the desired position upon the table, as indicated by dotted lines in said Fig. 11. Thereafter the sheet is engaged by the cross-feed and fed to the secondary scorers to be cut and scored thereby, said secondary scoring and cutting mechanism being the same as that shown and described relative to the primary scoring and cutting mechanism, with one of its end trimmers formed by a rotary cutter-disk 62 coacting with the end of the lower bed-roll 6'.

Referring to Figs. 12, 13, and 14, I have illustrated a device that may be employed in connection with the brush-downholds or as a substitute therefor in acting upon the sheets to stop the same in a desired position upon the table 13 after being passed through the primary scorers. In accordance with this feature of my invention the upper feed-roll 11 is yieldingly in contact with the lower roll by means of vertically-movable spring-pressed journal-blocks acting downward upon its end journals in the usual and ordinary manner. One of these journal-blocks (indicated at 63 in Fig. 12) is provided with a pin or stud 64, upon which is pivotally mounted a lever 65, one end of which latter is pivotally connected with a stationary pin or screw 66 upon the journal-block standard 67 and its opposite end or arm 68 extended out over the table 13 and provided with a pivotally-connected wheel or disk 68'. This wheel or disk normally rests upon the table 13 and is arranged to rotate in a direction at right angles to the path of movement of the sheet in passing from the feed-rolls upon said table, as shown. As a sheet is passed between the feed-rolls the upper roll is raised thereby and in turn raises the journal-block 63, which movement of the latter operates the lever 65 to elevate its outer or free end and raise the supported disk 68' above the table, all as indicated by dotted lines in Fig. 12. The disk is caused to remain thus elevated during the passage of the sheet between the rolls and until the leading edge of the same has passed thereunder, after which it is caused to drop upon the sheet at or before the time the latter has been fully moved onto the table by the rear engaging pins 59 and cause the same to be brought to

a standstill in its proper position upon the table, the periphery of the disk being milled or roughened to provide a frictional surface for engagement with the sheet. When the sheet is moved forward by the cross-feed to the secondary scorers, the disk if not elevated above the sheet will rotate freely upon the latter and not retard or interfere with its movement in such direction.

The means for controlling the drop of the disk 68 upon the sheet in proper time, whereby the latter will be brought to a standstill in the desired position upon the table, is as follows: A fixed arm or extension 70 of the standard 67 projects over the table 13 above the lever 65 and is provided adjacent to its end with a vertically-movable plunger 71, fitted within an opening 72 therein, which plunger is connected with the lever 65 through the medium of a pivoted link 73. Above the plunger 71 and with an air space or chamber 74 between their adjacent ends is seated a block 75, which latter is provided with a number of grooves 76 in its outer surface communicating between the top of the opening 72 and the said air-chamber 74. Passing through the center of the block 75 is a screw 77, which is provided with a tapering slot or groove 78, formed in one side of the same. By means of such described construction when the lever 65 is raised by the passage of a sheet between the feed-rolls, as indicated by dotted lines, the connected plunger 71 is moved upward, and thereby forces the air from the chamber 74 out through the openings in the block 75. Downward movement of the lever is then regulated by the rapidity of the inflow of the air into said chamber, as will be obvious, which may be regulated by raising or lowering the screw 77 to expose more or less of its tapering slot 78 above the block 75. A hinged cap 79 partially closes the upper end of the opening 72 to prevent dirt or other foreign matter getting therein, the same being provided with an opening 80 of greater size than the diameter of the screw 77 to permit of the ready passage of the air therethrough.

Referring to Figs. 15 to 22, inclusive, I have illustrated a somewhat-modified form of construction embodying my invention whereby the guard-plate may be actuated to control the feed of the sheets by the passage of the latter through the machine. In this instance the trip-rod 36 and its controller 35 are dispensed with and the action of the guard-plate controlled from the upper vertically-movable feed-roll 11. In accomplishing this the vibrating lever 45 and the adjacent guard-plate-supporting arm 27 are each provided with an extension 45' and 27', respectively, the lever extension being provided with a sliding pin 81 seated therein, which may be moved to project one end in front of the lever-arm 27', so as to engage with and rock the latter on the rod 28, and thereby swing the connected guard-plate back from beneath

the supported edge of a sheet, but which pin is movably held by a spring 82 out of position for engaging with the guard-arm and with one end projecting beyond the side of the lever opposite said guard-arm, as indicated by dotted lines in Figs. 15, 17, and 22.

The pin 81 is operated to secure connection or disconnection between the guard-plate and its actuating-lever 45 in a manner as follows:

10 An elbow-lever 83 is pivotally mounted upon the rod 32 with one arm having an antifric-tion-roll 84 resting upon the upper feed-roll and yieldingly held against the same by means of a spring 85, and its other arm hav-

15 ing connection with one end of a pitman-rod 86, which latter at its opposite end has a yield-ing connection with the upper end of a piv-oted lever 87, which is supported adjacent to the actuating-lever 45. A latch device 88 is

20 pivotally connected at one end with the lever 87 and supported with its free end normally resting upon the projecting rear end of the pin 81, as shown. As a sheet is fed between the feed-rolls, as indicated by dotted lines in

25 Fig. 15, the upper roll is thereby elevated and causes a backward movement of the lever 87 through the medium of the several connec-tions described, which movement of said le-

30 ver draws the end of the connected latch 88 backward, and from its position resting on the pin 81 permitting the same to drop to a po-sition opposite the end of the latter, as indi-

35 cated in Fig. 20, so that after the sheet has passed entirely through the feed-rolls and the several parts (excepting the latch) are returned to their normal position under the action of the spring 82, such return move-

40 ment of the lever 87 forces the latch against the pin 81 and causes the opposite end of the latter to project into position to engage with the guard-plate arm 27', and so operate the latter to swing the guard-plate from beneath the supported edge of a sheet. After the

45 guard-plate has been moved backward suffi-ciently to release the sheet further movement of the same causes an arm 90, carried there-by, to pass beneath the latch device and raise the same from engagement with the pin, which latter then springs back to its normal

50 position, and so permits the guard-plate to return to its normal position. The pin-en-gaging end of the latch 88 is formed in the arc of a circle to conform to the path of move-ment of the pin as given by its carrying-

55 lever.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. In a machine of the class described, the

60 combination, of primary and secondary scor-ing mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, means for receiving one edge of a sheet fed from the

65 primary scoring mechanism and supporting the same above the path of the reciprocating feed device, and mechanism controlled by the

passage of a sheet through the machine for operating said sheet-supporting means to per-mit the supported edge of the preceding sheet 7c to drop into the path of the feed device at a certain predetermined time, for the purpose set forth.

2. In a machine of the class described, the combination, of primary and secondary scor- 75 ing mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, means for receiving one edge of a sheet fed from the primary scoring mechanism and supporting 80 the same above the path of the reciprocating feed device, and mechanism, including a mov-able member arranged in the path of the sheet to be engaged and actuated thereby, for op-erating said sheet-supporting means to per- 85 mit the supported edge of the sheet to drop into the path of the feed device at a certain predetermined time, for the purpose set forth.

3. In a machine of the class described, the combination, of primary and secondary scor- 90 ing mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, mechan-ism for actuating said feed device with a con- 95 tinuous reciprocating movement, means for supporting one edge of a sheet above the path of the reciprocating feed device, and mechan-ism, arranged to be engaged and controlled by the passage of a sheet through the machine, for operating said sheet-supporting means to 100 permit the supported edge of the sheet to drop into the path of the feed device at a certain predetermined time, for the purpose set forth.

4. In a machine of the class described, the combination, of primary and secondary scor- 105 ing mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, a guard-plate for receiving one edge of a sheet fed from the primary scoring mechanism and sup- 110 porting the same above the path of the feed device, and mechanism controlled by the pas-sage of a sheet through the machine for op-erating said guard-plate to release the sup-ported edge of the sheet and permit it to drop 115 into the path of the feed device at a certain predetermined time, for the purpose set forth.

5. In a machine of the class described, the combination, of primary and secondary scor- 120 ing mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, a guard-plate for receiving one edge of a sheet fed from the primary scoring mechanism and sup- 125 porting the same above the path of the feed device, and automatic mechanism controlled by the passage of a sheet through the machine for operating said guard-plate to release the supported edge of the sheet and permit it to drop into the path of the feed device at a cer- 130 tain predetermined time, for the purpose set forth.

6. In a machine of the class described, the combination, of primary and secondary scor-

ing mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, a pivotally-suspended guard-plate for receiving one edge of a sheet fed from the primary scoring mechanism and supporting the same above the path of the feed device, and mechanism controlled by the passage of a sheet through the machine for operating said guard-plate to release the supported edge of the sheet and permit it to drop into the path of the feed device at a certain predetermined time, for the purpose set forth.

7. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, a guard-plate for receiving one edge of a sheet fed from the primary scoring mechanism and supporting the same above the path of the feed device, operating mechanism for moving said guard-plate to permit the supported edge of the sheet to drop into the path of the feed device, and means for controlling the action of said guard-plate-operating mechanism, including a movable member arranged in the path of the sheet to be engaged and operated thereby, for the purpose set forth.

8. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, a guard-plate supported above the table for receiving one edge of a sheet thereon and supporting the same above the path of the feed device, a vibrating lever, and means for securing connection and disconnection between said guard-plate and the vibrating lever, for the purpose set forth.

9. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, a guard-plate supported above the table for receiving one edge of the sheet thereon and supporting the same above the path of the feed device, actuating mechanism for moving said guard-plate from beneath the supported edge of the sheet, and means for securing connection and disconnection between said guard-plate and its actuating mechanism, for the purpose set forth.

10. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, a guard-plate pivotally suspended above the table for supporting one edge of the sheet above the path of the reciprocating feed device, actuating mechanism for moving said guard-plate from beneath the supported edge of the sheet, and means for securing connection and disconnection between said guard-plate and its

actuating mechanism, for the purpose set forth.

11. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, a guard-plate supported above the table for receiving one edge of the sheet thereon and holding the same above the path of the reciprocating feed device, actuating mechanism for moving said guard-plate, a device for securing connection and disconnection between said guard-plate and its actuating mechanism, and a controller for regulating the action of said device arranged to be actuated by a sheet during the passage of the latter through the machine, for the purpose set forth.

12. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, a guard-plate supported above the table for receiving one edge of the sheet thereon and holding the same above the path of the feed device, actuating mechanism for moving said guard-plate, a device for securing connection and disconnection between said guard-plate and its actuating mechanism, means arranged to be operated by a sheet for moving said device into position to connect the parts, and means for automatically moving said device to disconnect the parts after the guard-plate has been operated, substantially as and for the purpose set forth.

13. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, a guard-plate supported above the table for receiving one edge of a sheet thereon and holding the same above the path of the feed device, actuating mechanism for moving said guard-plate, a device for securing connection and disconnection between said guard-plate and its actuating mechanism, means arranged to be operated by a sheet for moving said device into position to connect the parts, and means for moving said device to disconnect the parts after the guard-plate has been operated, for the purpose set forth.

14. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, a reciprocating feed device for feeding a sheet to the secondary scoring mechanism, a guard-plate pivotally suspended above the table, a vibrating lever, a sliding rod carried with said guard-plate, a controller connected with said rod and arranged to be operated by a sheet to move the rod into operative position to be engaged by said lever, and means for automatically moving the rod from its said operative position at a predetermined time, for the purpose set forth.

15. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, a reciprocating feed device for feeding a sheet
5 to the secondary scoring mechanism, a guard-plate pivotally suspended above the table, a continuously-vibrating lever provided with a groove, a sliding rod carried with said guard-plate, a controller having a yielding connection with said rod and arranged to be operated by a sheet to move the rod into position to engage with said lever, and means for automatically withdrawing said rod from engagement with the lever after the guard-plate
10 has been moved by the latter, for the purpose set forth.

16. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, a
20 reciprocating sheet-feed device having a cam-surface thereon, a guard-plate pivotally suspended above the table, a vibrating lever operated by said cam-surface on the feed device, and means for securing connection and
25 disconnection between said lever and guard-plate, for the purpose set forth.

17. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, a
30 feeding device for feeding a sheet to the secondary scoring mechanism, and a roll located between the primary scoring mechanism and the table provided with means for engaging with the rear edge of the sheet and positively
35 moving the latter to a desired position on the table, for the purpose set forth.

18. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, a
40 feeding device for feeding a sheet to the secondary scoring mechanism, and a roll provided with means for engaging with the rear edge of the sheet after being operated upon by the primary scoring mechanism and positively
45 moving the same to a desired position on the table, for the purpose set forth.

19. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, a
50 feeding device for feeding a sheet to the secondary scoring mechanism, a suitable downhold for acting upon the sheet as it is fed onto the table from the primary scoring mechanism, and a roll located between the latter
55 and the table provided with means for engaging with the rear edge of the sheet and positively moving the latter to a desired position on the table, for the purpose set forth.

20. In a machine of the class described, the
60 combination, of primary and secondary scoring mechanisms, a table between the same, a feeding device for feeding a sheet to the secondary scoring mechanism, and a revolving roll located between the primary scoring
65 mechanism and the table provided with yieldingly-projecting pins for engaging with the rear edge of the sheet and positively moving

the latter to a desired position on the table, for the purpose set forth.

21. In a machine of the class described, the
70 combination, of primary and secondary scoring mechanisms, a table between the same, a feeding device for feeding a sheet to the secondary scoring mechanism, and a pair of revolving feed-rolls between the primary scor-
75 ing mechanism and the table, the lower roll being provided with pins for engaging with the rear edge of the sheet, and the upper roll being provided with annular grooves opposite the pins in the lower roll, for the purpose
80 set forth.

22. In a machine of the class described, a scoring and trimming mechanism comprising a bed-roll, a scoring-knife coacting with
85 said bed-roll between the ends thereof, a rotary trimmer-knife arranged at one end of said bed-roll with its cutting edge coacting with the edge of the latter, a pin or shaft carrying said trimmer-knife, and an adjustable sleeve supporting said pin or shaft, for the
90 purpose set forth.

23. In a machine of the class described, the combination, with a scoring and trimming mechanism comprising a bed-roll and a scor-
95 ing or cutting knife coacting therewith, of a rotary trimmer-knife coacting with the end of the bed-roll, a pin or shaft carrying said trimmer-knife, and a sleeve supporting said pin or shaft having an adjustable connection with a stationary supporting part of the ma-
100 chine, for the purpose set forth.

24. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, means for feeding the sheets to the secondary
105 scoring mechanism, and means for controlling the movement of the sheets onto the table from the primary scoring mechanism, comprising a pair of feed-rolls, the upper one of which is vertically movable, a pivoted lever
110 arranged with one end projecting over the table and having means for engaging with the sheet fed onto the latter, the said lever being operatively connected with said upper feed-roll to be actuated thereby upon the pas-
115 sage of a sheet between the rolls and raise its sheet-engaging means above the table, and means for controlling the downward movement of the lever to its operative position, for the purpose set forth.
120

25. In a machine of the class described, the combination, of primary and secondary scoring mechanisms arranged at substantially
125 right angles to each other, a table between the same, means for feeding the sheets to the secondary scoring mechanism, and means for controlling the movement of the sheets onto the table from the primary scoring mechanism, comprising a pair of feed-rolls, the up-
130 per one of which is vertically movable, a lever arranged with one end projecting over the table and provided with a pivoted disk or wheel arranged with its axis parallel with the path of movement of the sheet in passing

5 onto the table, the said lever being operatively connected with said upper feed-roll to be actuated thereby upon the passage of a sheet between the rolls and raise its sheet-engaging means above the table, and means for controlling the downward movement of the lever, for the purpose set forth.

10 26. In a machine of the class described, the combination, of primary and secondary scoring mechanisms, a table between the same, means for feeding the sheets to the secondary scoring mechanism, and means for controlling the movement of the sheets onto the table from the primary scoring mechanism, 15 comprising a pair of feed-rolls, the upper one of which is vertically movable, a lever arranged with one end projecting over the ta-

ble and provided with means for engaging with the sheet fed onto the latter, the said lever being operatively connected with said 20 upper feed-roll to have its sheet-engaging means raised thereby, and means for controlling the downward movement of the lever, comprising a stationary arm or frame having an opening or chamber therein, a plunger 25 fitted to slide in said opening and having connection with the lever, and means for timing the downward movement of the plunger within its chamber, for the purpose set forth.

MARK D. KNOWLTON.

Witnesses:

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