No. 747,395. PATENTED DEC. 22, 1903.

L. F. FALES.

FEEDER.

APPLICATION FILED DEC. 29, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

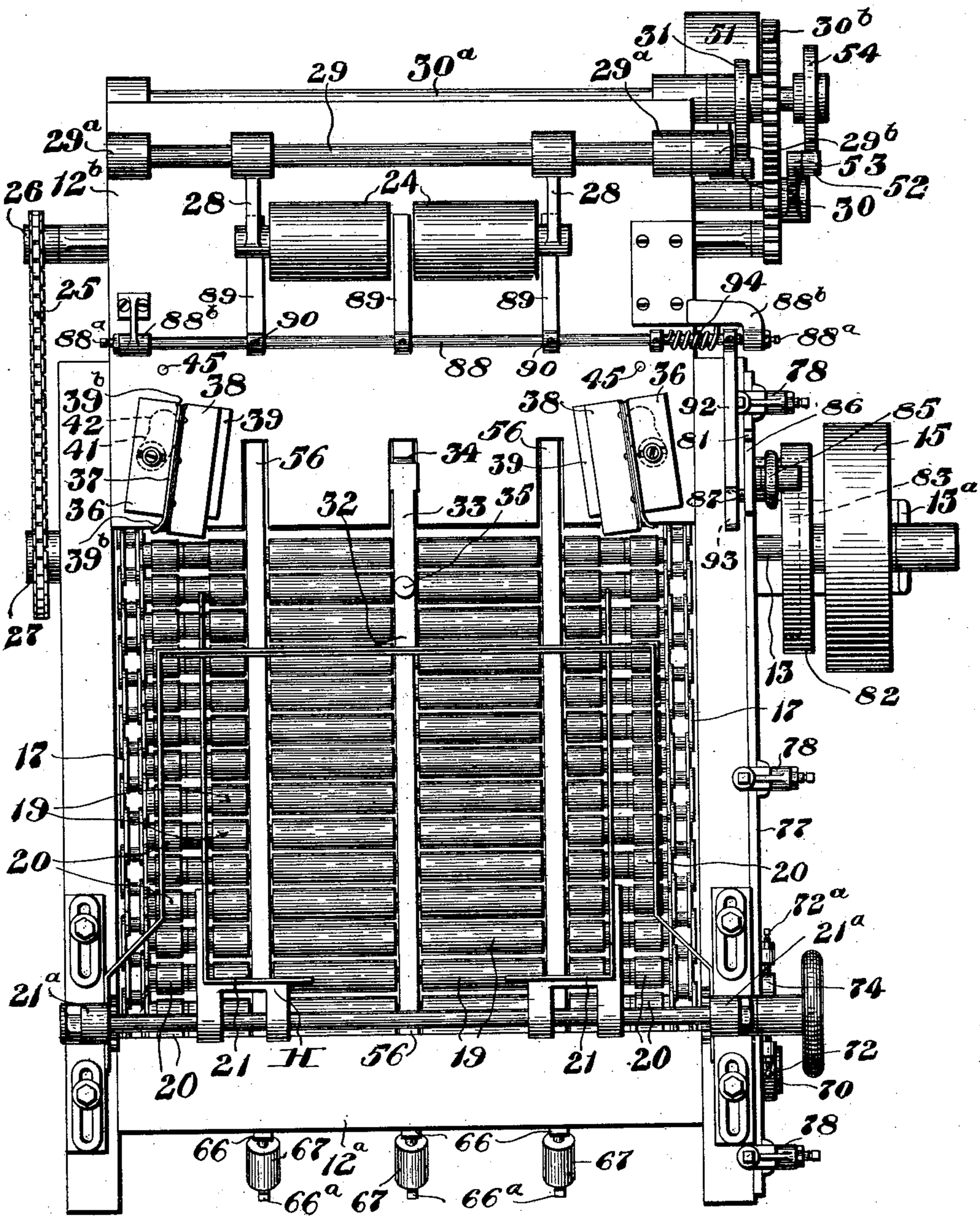

Fig. 1.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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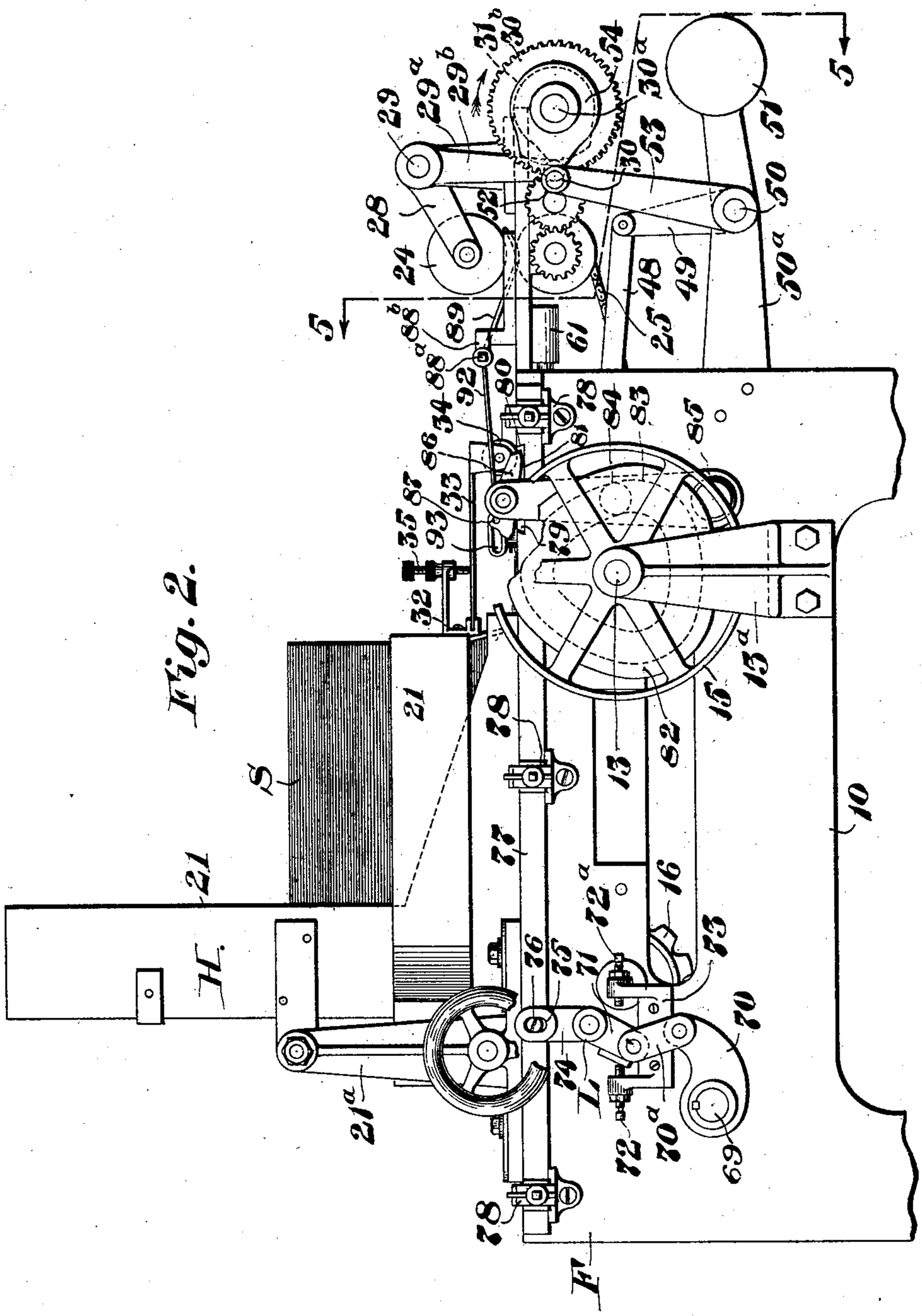
NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 3.

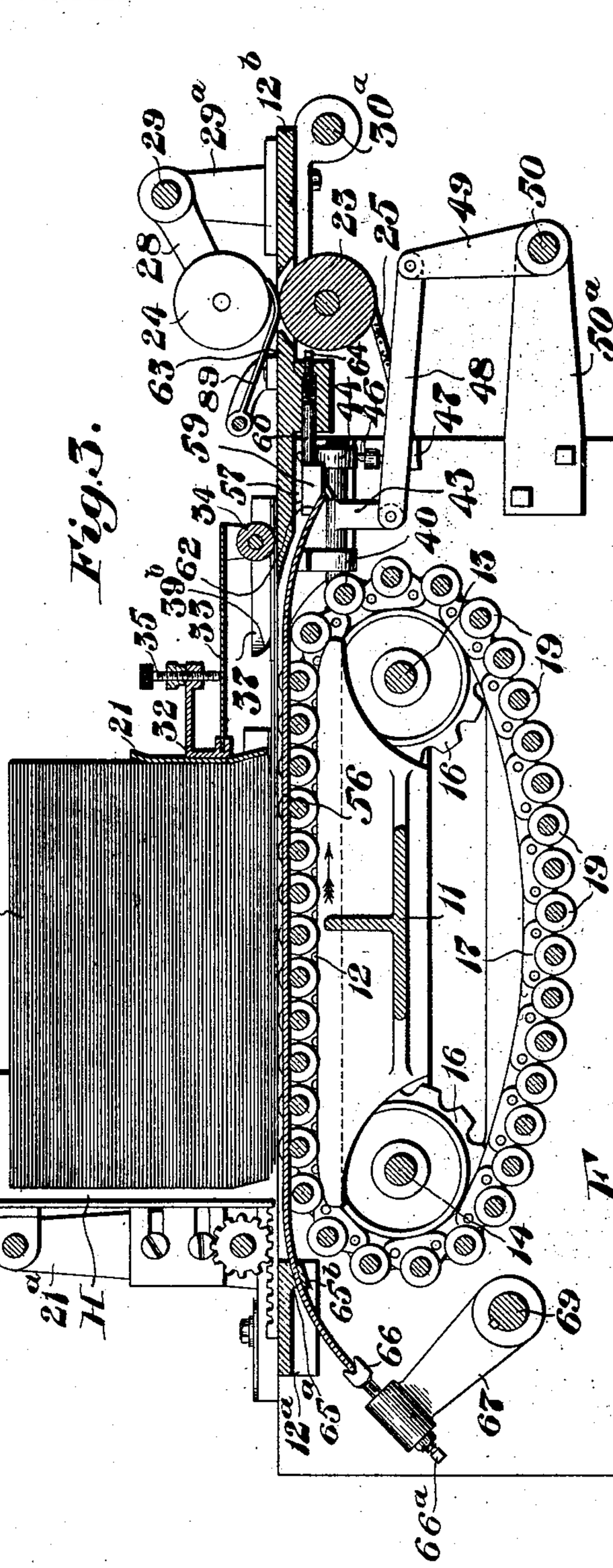

Fig. 4.

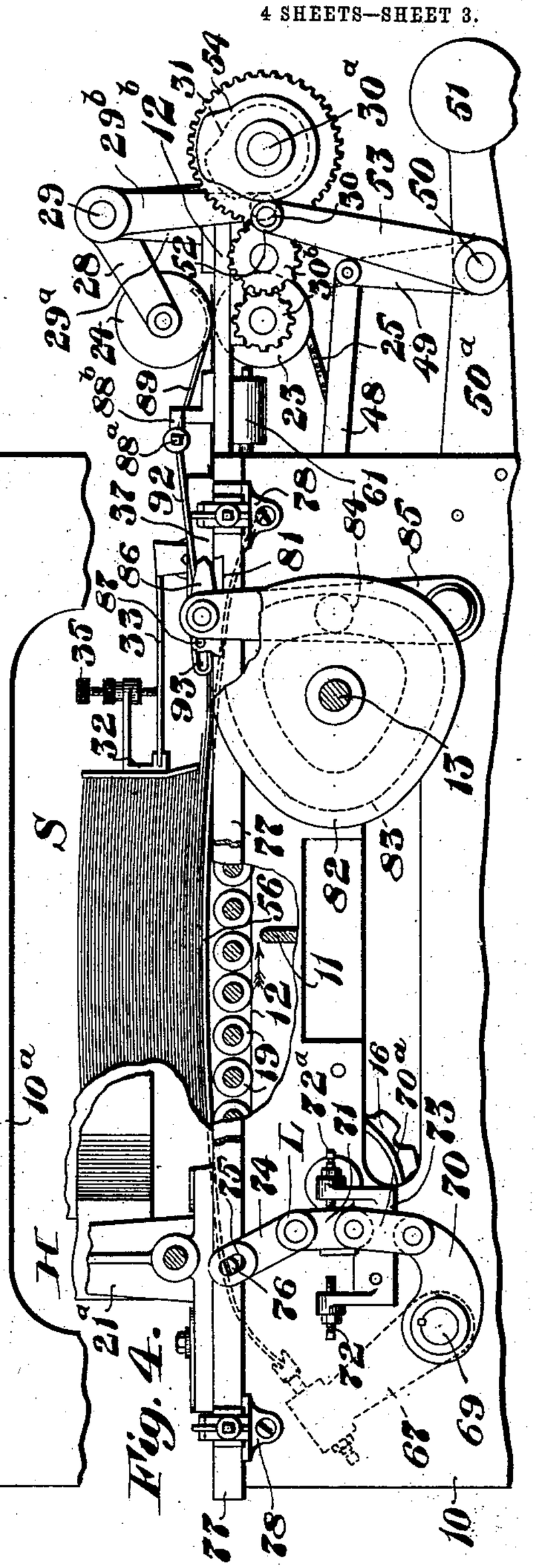

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Fig. 5.

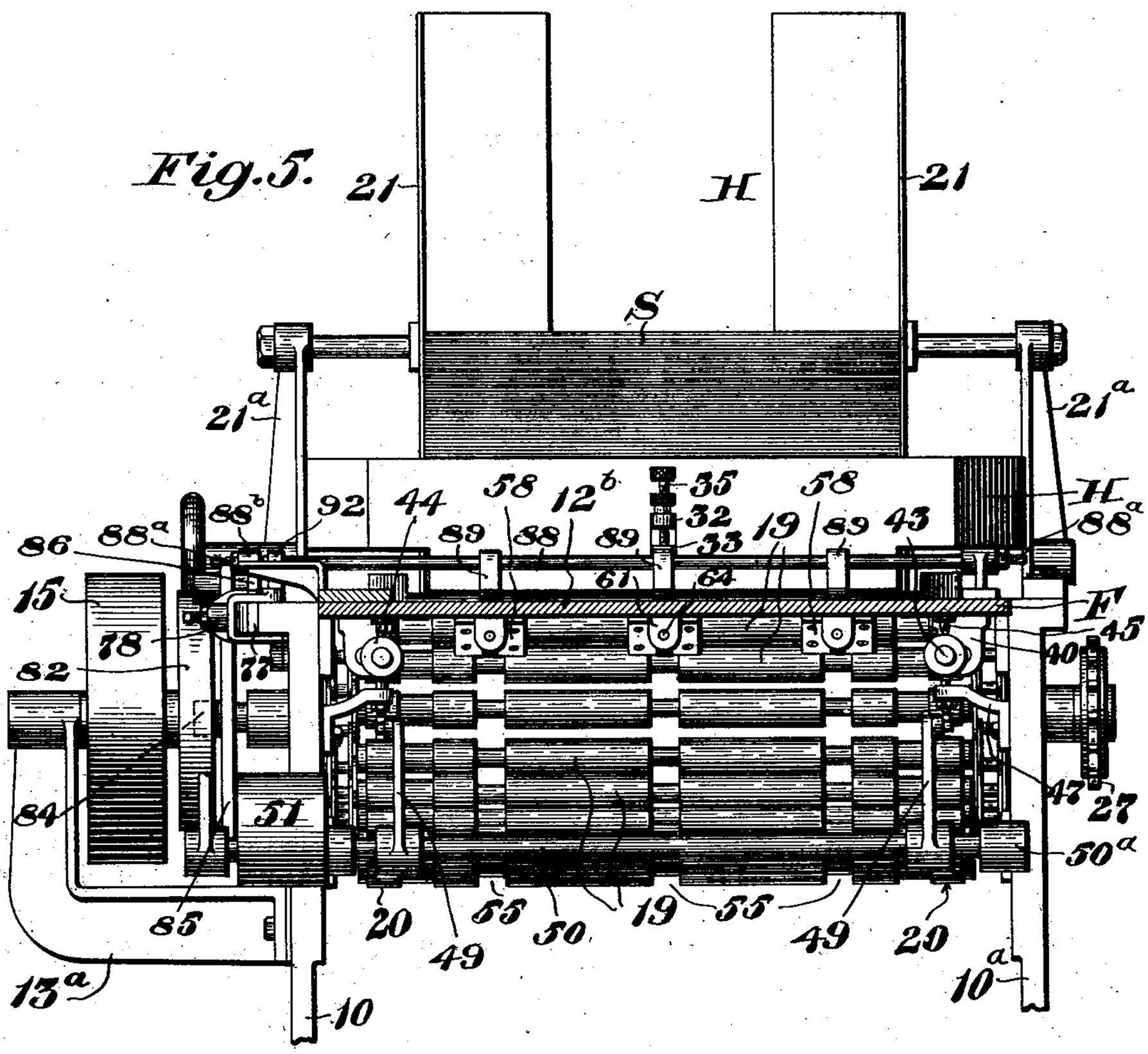


Fig. 6.

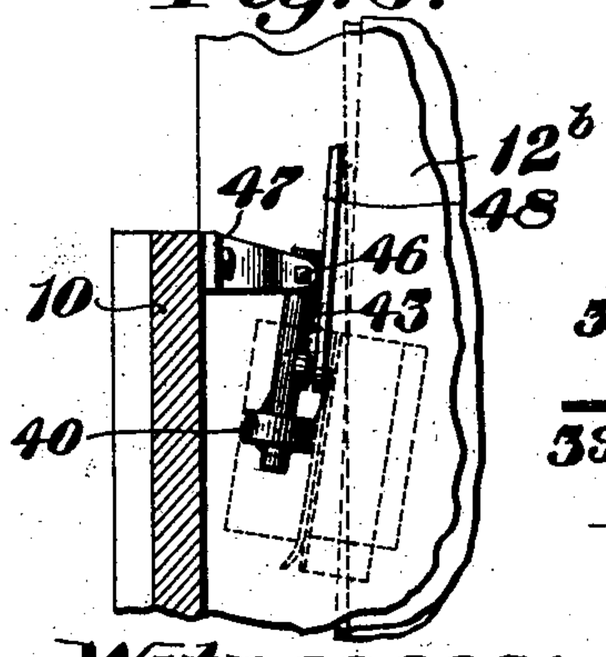


Fig. 8.

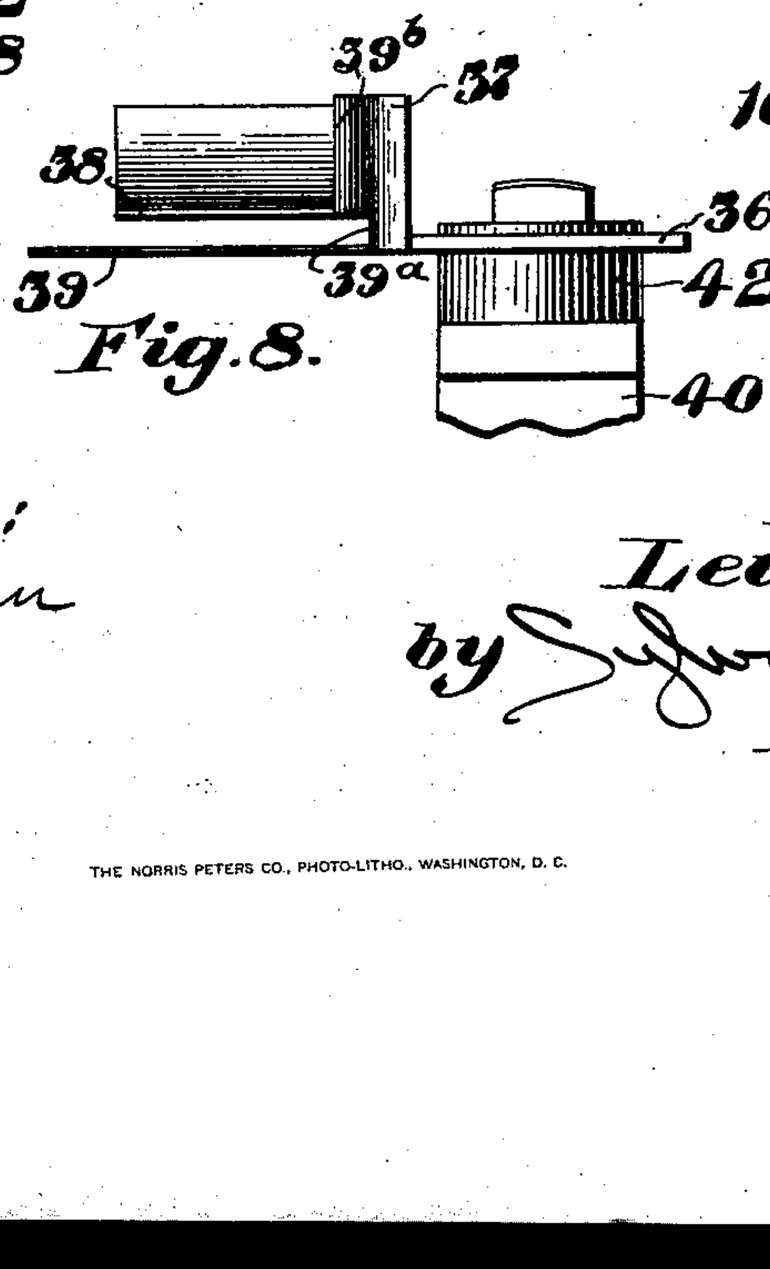
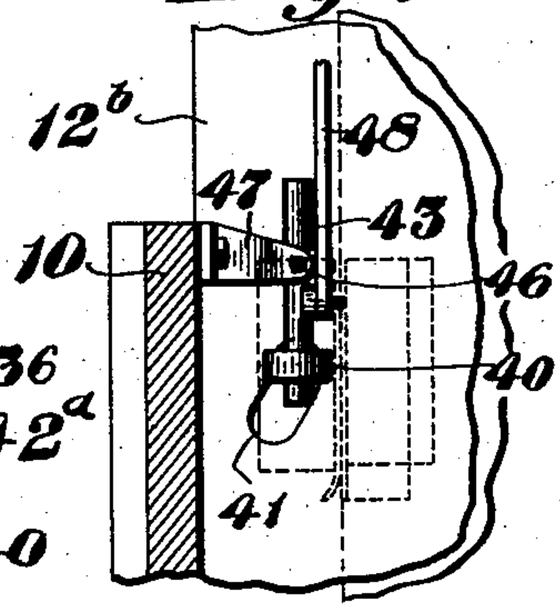


Fig. 7.



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No. 747,395. Patented December 22, 1903.

UNITED STATES PATENT OFFICE.

LEWIS F. FALES, OF WALPOLE, MASSACHUSETTS.

FEEDER.

SPECIFICATION forming part of Letters Patent No. 747,395, dated December 22, 1903.

Application filed December 29, 1902. Serial No. 136,989. (No model.)

To all whom it may concern:

Be it known that I, LEWIS F. FALES, a citizen of the United States, residing at Walpole, in the county of Norfolk and State of Massachusetts, have invented a new and useful Improvement in Feeders, of which the following is a specification.

My invention relates to machines for feeding sheets of flexible material, and has for its principal objects the provision of mechanism for controlling the delivery of the sheets and to mechanism for adjusting in position or squaring said sheets as they are delivered.

In the accompanying drawings, Figure 1 is a top plan view of one form of my improved feeder. Fig. 2 is a side elevation looking from the right in Fig. 1, with the lower portion of the frame broken away. Fig. 3 is a central vertical longitudinal section showing the position of the elements and sheets before the latter advance between the delivery-rolls. Fig. 4 is a view similar to Fig. 2, but with portions broken away and in section, showing the position with the sheets advanced. Fig. 5 is a transverse vertical section on the line 5 5 of Fig. 2 looking in the direction of the arrows. Figs. 6 and 7 are details in bottom plan, showing the gages and actuating mechanism therefor in their two extreme positions; and Fig. 8, an enlarged end elevation of one of the gages.

Similar characters indicate like parts throughout the several figures of the drawings.

My invention is particularly adapted for use with that well-known type of feeder in which a series of traveling rolls support a pile or a bank of sheets and successively feed forward the lower ones. Therefore for the purpose of disclosing an embodiment of the invention such a machine has been illustrated.

The letter F designates some suitable support, of which the upper portion only is shown, consisting of side frames 10 10^a and a cross-bar 11, extended at its ends along the side frames and provided in proximity thereto upon its upper side with finished surfaces or ways 12 12. Transverse plates 12^a 12^b also connect the tops of the side frame at or near the opposite ends. Journaled in the side frames and in an arm 13^a extending therefrom are transverse shafts 13 14, the former of which may carry a driving-pulley 15. Both shafts preferably have mounted upon them pairs of sprockets 16 16, over which run suitable chains 17 17. In bearings in the links of the chain, situated at proper intervals along the same, are journaled rolls 19, which may be provided near their ends with anti-friction-rolls 20, running over the ways 12 to insure the movement of the rolls 19 in a substantially horizontal plane.

Supported above the rolls is a holder H, serving to retain the pile of sheets S in the proper position for feeding, this holder consisting of suitable walls 21, supported adjustably, if desired, by standards 21^a, slidable upon the side frames.

The bottom sheets of the pile within the holder will be successively acted upon by the rolls upon which they rest, as these are continuously moved over the ways in the direction of the arrows in Figs. 3 and 4 and gradually fed forward under the front wall of the holder in the well-known manner, passing from the rolls onto a support at the front of the machine, which may consist of the plate 12^b, and assuming the position illustrated in Fig. 3. Here the foremost sheet enters between a pair of pinch-rolls 23 24. The roll 23 may be journaled beneath the plate 12^b, with its upper surface lying in proximity to the top of said plate, and be continuously rotated by a chain 25, passing over sprockets 26 27 on its shaft and the shaft 13, respectively. The roll 24, which is shown as divided, may be journaled at the end of a pair of arms 28 28, fast upon a transverse shaft 29, journaled in standards 29^a, rising from the plate 12^b. An arm 29^b upon the shaft is provided with a roll 30 for coaction with a cam 31 on a shaft 30^a, journaled at the outer end of the plate and rotated by gearing 30^b from the shaft of the roll 23. This moves the roll 24 toward and from its companion roll, the two coöperating to intermittently seize and deliver the foremost sheet from the feeding mechanism to the machine which is to operate upon it.

To the front wall of the holder is preferably secured a bracket 32, from which projects a spring-arm 33, carrying at its outer end a pressure-roll 34, preferably of rubber, which bears upon the top of the sheets as they

project from the holder. This serves to maintain them in operative contact with the feeding-rolls after they have reached a point at which they have upon them but a portion of the weight of the pile, and also assists in preventing the upper advanced sheets from being pulled forward with that delivered by the pinch-rolls. A screw 35, conveniently threaded through the bracket and contacting with the arm 33, enables the pressure of the roll 34 to be adjusted.

Preferably on each side of the path of the sheet, just above the surface of the plate 12^b and not far from the pinch-rolls, is situated a gage to square the sheets if they have been displaced or skewed to one side in feeding, and thus insure their being properly presented to the rolls. Each of my improved gages, as here illustrated, consists of a supporting-plate 36, provided with a vertical flange 37, to which are secured top and bottom gage-plates 38 39, respectively, between which is a side wall 39^a at the face of the flange, the ends of the upper gage-plates and side wall being preferably curved or flared at 39^b. The supporting-plates are secured to carriers 40, which may project through slots 41 in the table, the connection between the carrier and gage preferably being through transverse openings in the latter, which allow them to be adjusted toward and from the sheets. The slots 41 are inclined or lie at an angle to the path of the sheets extending toward them and in the direction of their advance and terminate at their forward end in a short portion 42, parallel to the path of the sheet. The portion 42^a of the carrier within the slot and in contact with the walls is preferably cylindrical. The carrier is shown as secured to one of the horizontal legs of a T-shaped member 43, the opposite leg of which slides within a bearing 44, trunnioned upon screws 45 46, taking through the plate 12^b and a bracket 47, secured to one of the side frames, respectively. To the vertical leg of the T member is pivoted a connecting-rod 48, which is also articulated to an arm 49, fast upon a shaft 50, journaled in brackets 50^a 50^a, secured to the side frames. A weighted arm 51 acts to hold an antifriction-roll 52 upon an arm 53 at one end of the shaft 50 against a cam 54 on the shaft 30^a.

The contour of the cam 54 and the relation of the elements is such that as the foremost sheet starts to advance between the pinch-rolls, which are separated to receive it, the portions 42 of the carriers are at the outer ends of the slots 41, and the gages are inclined with relation to the edges of the sheets, as is shown in Figs. 1 and 6. As the sheet is advanced the gages are simultaneously moved inward and forward by their actuating members, the sheet entering between the top and bottom plates, and if out of its proper position contacting with the side wall 39^a of the gage toward which it is displaced, which moves it inward and at the same time tends to aid in feeding it forward by the component of its movement in that direction. As the sheet reaches its position between the pinch-rolls the carriers enter the portions 42 of the slot, and the gages assume their final position, with the side walls substantially parallel to the sides of the sheet and in contact therewith. Then as the rolls seize and deliver the sheet the gages are withdrawn and assume their initial position. The free compound movement of the carriers in the slots is at all times permitted by the longitudinal reciprocation of the T member and the lateral oscillation of the trunnioned bearing in which it slides.

In feeders of this class—that is, in which sheets are successively advanced to be seized and delivered to some continuously and regularly operating machine—it is highly desirable that the feed shall be accurately timed with respect to the machine supplied to prevent the possibility of the sheets being too rapidly advanced, as a result, for example, of variation in the surface of the stock, and thus causing a plurality of the sheets to be operated upon. To accomplish this, my improved feeder effects a complete cessation of feed from the pile of sheets by intermittently removing said pile and the feeding mechanism from operative coaction, in the present instance the sheets being raised from the feeding-rolls. The means for accomplishing this may be, for convenience in description, divided into three sets of elements, which are hereinafter termed the "stop" mechanism, "actuating" mechanism, and "controlling" mechanism.

The rolls 19 are each preferably provided with grooves 55, here shown as three in number and arranged in alinement to form parallel series extending longitudinally of the machine. Along these series of grooves lie bars 56, preferably of some flexible material, as steel, said bars being substantially straight where they run along the horizontal line of feeding-rolls beneath the pile of sheets and being bent or curved downward at each end. At one extremity, here shown as the forward end, they preferably pass between pairs of lugs 57 57, conveniently cast upon the under side of the plate 12^b, and may be supported by pairs of separated cap-plates 58 58, removably secured thereto. Just beyond the end of each bar may be provided a head 59, supported by an extension 60, which slides in a bore in a lug 61 upon the under side of the plate. An inclined face 62 upon each head may contact with the upper side of the bar between the cap-plates and be forced against it by a spiral spring 63, seated within the bore. These spring-pressed heads tend to force the bars downward slightly into the grooves, and thus prevent their rattling by the contact of the traveling rolls. A screw 64 is threaded through the end of each lug and projects into the bore through the spring, contacting with the extension of the head when this is pressed outward and serving to

adjust its range of movement in this direction. At the opposite end each bar is similarly curved downward through an opening formed by pairs of lugs 65^a 65^a, covered by a cap-plate 65^b, and rest in a socket 66, carried in an opening at one end of an arm 67, suitably secured to a transverse rock-shaft 69, journaled in the side frames. The sockets 66 may slide in the openings and be adjusted in position by screws 66^a, threaded through the arms and contacting with the ends of the sockets. At or near one end of this shaft 69 is secured an arm 70, to which is pivoted a link 70^a, which is in turn articulated to the lower arm 71 of an angle-lever L, fulcrumed on the side frame 10, the link and the arm 71 forming a toggle-lever. Contact-screws 72 72^a, threaded through a double bracket 73 on each side of the lever L, adjustably limit its movement in either direction. The upper arm 74 of the angle-lever is preferably provided with a slot 75, into which extends a projection or pin 76, carried by a reciprocatory bar 77, sliding along the side frame 10 and retained in place by suitable brackets 78. The opposite extremity of the bar 77 in proximity to the driving-shaft is preferably provided with contact-faces 79 80, conveniently formed by the opposite end walls of a recess 81. The above elements may be considered to constitute the stop mechanism.

The actuating mechanism for the stop mechanism, as here illustrated, consists of a cam 82, preferably mounted on the driving-shaft 13 and provided with a groove 83 of the form illustrated, with which coacts a projection or pin 84 upon a lever 85, fulcrumed to the side frame, and which is continuously oscillated by the cam. At the upper end of the lever 85 is pivoted a pawl 86, provided with a pin or projection 87 at one side, the opposite ends of which pawl may be brought into coöperation with the contact-faces 79 80 by the controlling mechanism, which will now be described.

Over the plate 12^b somewhat in the rear of the pinch-rolls is supported for free rotary oscillation a transverse shaft or rod 88, conveniently upon screws 88^a, threaded through standards 88^b 88^b, projecting above the plate and engaging depressions at the ends of the shaft, said shaft carrying contact members or fingers 89, which may be adjustably secured thereon by set-screws 90 or the like. The ends of these fingers may normally rest upon the roll 23 or on the plate 12^b in the line of the rolls. To the shaft 88 upon the end toward the pawl 86 is fastened an arm 92, preferably of such flexible material as steel. This arm has a slot 93, which receives the pawl-pin 87. A torsion-spring 94 is secured to the shaft and to one of the standards and preferably exerts its force to hold the fingers normally downward.

In the operation of the machine as the foremost sheet advances from the feeding-rolls toward the delivery-rolls, the upper of which is raised to receive it, the fingers are resting upon the lower roll and the slot in the arm is held in such a position that the projection 87 as the pawl is continuously oscillated by the cam moves freely back and forth therein, with one end of said pawl resting in the recess 81 without coaction with either contact-face. The position of the bar 77 is such that the lever L is in contact with the screw 72, giving the arms 67 their rearward position and permitting the bars 56 to lie in their grooves slightly beneath the surface of the feeding-rolls. As the foremost sheet continues its advance to its position between the delivery-rolls it lifts the fingers 89. This rocks the shaft 88 and lowers the arm 92, which pressing upon the pin 87 lowers the raised end of the pawl, the spring in the arm compelling it to snap quickly into the recess if it happens to fall upon the upper surface of the bar. Having entered the recess, in its oscillation toward the rear of the machine the pawl engages the contact-face 79 and moves the bar 77, shifting the connecting-lever system against the stop 72^a. This rocks the arms 67 forward and pressing against the ends of the bar 56 bend them upward into the arched shape illustrated in Fig. 4, which gives the maximum supporting strength with the minimum weight, so that at least the central portion of each rises above the roll-grooves and is pressed with the greatest force against the pile of sheets, removing them sufficiently from feeding-rolls to prevent them from acting to advance said sheets. The stop 72^a is preferably so adjusted that the toggle-arms move somewhat by the center or position of maximum extension, so that they are locked against movement by the arm 70 under the tendency of the bars to straighten, since this force is exerted in a direction substantially longitudinal of the toggle-lever. This cessation of feed is aided and made more positive by the retarding influence of the bars 56, which act by their contact with the lower sheets as brakes to counteract any tendency which might remain for these sheets to be moved by partial contact with the rolls. The extent of movement of the bars from the grooves may be regulated by the screws 64 and 66^a. The sheets now remain stationary while the upper pinch-roll descends and delivers the sheet to the associated machine at the proper time. When this occurs, the fingers fall from the rear edge of the sheet upon the table. This raises the arm 93 and depresses the opposite end of the pawl, which is oscillated against the contact-face 80, and shifting the reciprocatory bar, which, acting laterally of the toggle-lever, breaks it and restores the various elements of the stop mechanism to their initial position, allowing the pile of sheets to resume operative contact with the feeding-rolls, which again act to advance them. The independent adjustment for each bar permits them to be caused to act against the pile with equal

force, and thus prevent skewing of the sheets by uneven pressure while they are still moving.

It will be seen that in my feeder the sheets operated upon will be presented squarely to the delivery-rolls or like devices without friction or drag on the edges and that the presentation may be effected with absolute accuracy, since there can be no movement of sheets from the pile until that preceding it has been removed, and the foremost sheet cannot be advanced beyond the desired position.

Having thus described my invention, I claim—

1. The combination with continuously-operating mechanism for successively feeding sheets from a pile, of controlling mechanism moved in opposite directions by the introduction and the withdrawal of a sheet, and mechanism positively connected with the controlling mechanism to which these movements are communicated to effect a cessation of the feed from the pile upon the movement of said controlling mechanism in one direction and a renewal thereof upon its movement in the opposite direction.

2. The combination with continuously-operating mechanism for successively feeding sheets from a pile, of means for withdrawing the foremost sheet, controlling mechanism normally contacting with the withdrawing means, and mechanism connected with the controlling mechanism for effecting a cessation of the feed from the pile until the withdrawal of said foremost sheet.

3. The combination with mechanism for successively feeding sheets from a pile, of controlling mechanism moved in opposite directions by the introduction and withdrawal of a sheet, and mechanism positively connected with the controlling mechanism to which these movements are communicated to remove the feeding mechanism and pile of sheets from operative coaction upon the movement of said controlling mechanism in one direction and to reëstablish the coaction upon its movement in the opposite direction.

4. The combination with a continuously-operating mechanism for successively feeding sheets from a pile, of means for intermittently applying pressure to the pile to retard the feeding movement of the sheets, the maximum pressure being applied near the center of the pile.

5. The combination with mechanism for successively feeding sheets from a pile, of stop mechanism adapted to raise the sheets from operative coaction with the feeding mechanism, actuating mechanism for the stop mechanism, and controlling mechanism operable by the foremost sheet for connecting and disconnecting the actuating mechanism and stop mechanism.

6. The combination with traveling rolls for successively feeding sheets from a pile, of stop mechanism adapted to raise the sheets from operative coaction with the feeding mechanism, actuating mechanism for the stop mechanism, and controlling mechanism for connecting the actuating mechanism and stop mechanism.

7. The combination with mechanism for successively feeding sheets from a pile, of a bar in proximity to the rolls, and means for bending the bar to prevent operative coaction between the feeding mechanism and sheets.

8. The combination with traveling rolls for successively feeding sheets from a pile, of a curved bar in proximity to the rolls, and means for bending the bar to prevent operative coaction between the rolls and sheets.

9. The combination with mechanism for successively feeding sheets from a pile, of a plurality of bars in proximity to the feeding mechanism, means for simultaneously moving the bars to prevent operative coaction between the feeding mechanism and the sheets, and means for independently adjusting the extent of movement of each bar.

10. The combination with mechanism for successively feeding sheets from a pile, of a plurality of bars in proximity to the feeding mechanism, means for simultaneously moving the bars to prevent operative coaction between the feeding mechanism and the sheets, a member coacting with each bar, and means for independently adjusting the position of each member whereby the movement of the bars is controlled.

11. The combination with rolls provided with grooves said rolls being adapted to support and feed successively from a pile of sheets, of a member normally lying in the grooves, and means for intermittently moving the member from the grooves toward the sheet, the maximum movement of said member being near the center of the pile.

12. The combination with rolls provided with grooves said rolls being adapted to support and feed successively from a pile of sheets, of a bar normally lying in the grooves, a spring exerting its force against one end of the bar, and means for moving at least a portion of the bar from the grooves toward the sheets.

13. The combination with rolls provided with grooves said rolls being adapted to support and feed successively from a pile of sheets, of a bar normally lying in the grooves, and means for bending the central portion of the bar from the grooves toward the sheets.

14. The combination with mechanism for successively feeding sheets from a pile, of a bar in proximity to the feeding mechanism, an arm coöperating with the bar, and means for rocking the arm to force the ends of the bar toward one another.

15. The combination with mechanism for successively feeding sheets from a pile, of bars in proximity to the feeding mechanism, an arm coöperating with each of the bars, a

shaft to which the arms are secured, and means for rocking the shaft to force the arms against the ends of the bars.

16. The combination with mechanism for successively feeding sheets from a pile, of a bar, a spring exerting its force against one end of the bar, an arm coöperating with the opposite end of the bar, and means for moving the arm to force the bar against the sheet.

17. The combination with mechanism for successively feeding sheets from a pile, of a bar, a toggle-lever connected with the bar, and means for bending the toggle-lever to force the bar against the sheets.

18. The combination with mechanism for successively feeding sheets from a pile, of a bar, a system of levers connected to the bar, a reciprocatory bar connected to the lever system, and actuating mechanism operating upon the reciprocatory bar.

19. The combination with mechanism for successively feeding sheets from a pile, of stop mechanism adapted to prevent operative coaction between the feeding mechanism and sheets, a continuously-rotating cam, and means operable by a sheet for connecting the cam with and disconnecting it from the stop mechanism.

20. The combination with mechanism for successively feeding sheets from a pile, of stop mechanism adapted to prevent operative coaction between the feeding mechanism and sheets, a continuously-rotating cam, a pawl oscillated by the cam, and means for effecting engagement between the pawl and stop mechanism to actuate said stop mechanism.

21. The combination with mechanism for successively feeding sheets from a pile, of stop mechanism adapted to prevent operative coaction between the feeding mechanism and sheets including a reciprocatory bar provided with two contact-faces, a continuously-rotating cam, a pawl oscillated by the cam, and means for moving the pawl so that it may engage the bar contact-faces.

22. The combination with mechanism for successively feeding sheets from a pile, of stop mechanism adapted to prevent operative coaction between the feeding machanism and sheets, actuating mechanism for the stop mechanism including an oscillatory pawl, a finger movable by the sheets as they are fed, and connections between the finger and pawl whereby the movement of said finger causes the pawl to engage the stop mechanism.

23. The combination with mechanism for successively feeding sheets from a pile, of stop mechanism adapted to prevent operative coaction between the feeding mechanism and sheets, actuating mechanism for the stop mechanism including an oscillatory pawl, a finger movable by the sheets as they are fed, and a spring-arm moving with the finger and connected with the pawl.

24. The combination with mechanism for successively feeding sheets from a pile, of stop mechanism adapted to prevent operative coaction between the feeding mechanism and sheets, actuating mechanism for the stop mechanism comprising an oscillatory pawl provided with a projection, a finger movable by the sheets as they are fed, and an arm moving with the finger and having a slot cooperating with the pawl projection.

25. In a feeder, the combination with a series of traveling rolls provided with grooves said rolls being adapted to support and feed successively from a pile of sheets, of a pair of rolls serving to withdraw the foremost sheet, a flexible bar lying in the grooves of the feeding-rolls, a lever system coöperating with one end of the flexible bar, a reciprocatory bar provided with opposite contact-faces and connected with the lever system, a pawl provided with a projection, a cam for continuously oscillating the pawl, a movable finger situated in the path of the foremost sheet, and an arm connected with the finger and having a slot coöperating with the pawl projection, the elements being so related that the pawl may engage one contact-face with one end upon the advance of a sheet beneath a finger and the other contact-face with the opposite end upon the withdrawal of the sheet.

26. The combination with mechanism for feeding sheets, of a gage for a side of the sheets, a support for the gage, a movable bearing for the support, and means for imparting a compound movement to the support through and with the bearing.

27. The combination with mechanism for feeding sheets, of a support over which the sheets move provided with an inclined slot at each side of the path of the sheets extending toward said sheets and in the direction of their advance, gages for the sheets, and means for moving the gages along the slots.

28. The combination with mechanism for feeding sheets, of a support over which the sheets move provided with a slot at each side of the path of the sheets, carriers situated in the slots, gages mounted upon the carriers, supports for the carriers, trunnioned bearings in which the supports may slide, and means for reciprocating the carrier-supports through the bearings and along the slots.

29. The combination with mechanism for feeding sheets, of a member provided with a slot at each side of the path of the sheets, one portion of each slot lying at an angle and another portion extending parallel to said sheets, gages coacting with the sheets, and means for moving the gages along the slots.

Signed at Walpole, in the county of Norfolk and State of Massachusetts, this 22d day of November, 1902.

LEWIS F. FALES.

Witnesses:

GEORGE A. FALES,

MARGARET C. DALTON.