No. 714,847. Patented Dec. 2, 1902.

G. R. WILLIAMS.

PAPER FEEDING MACHINE.

(Application filed Aug. 12, 1901.)

(No Model.) 6 Sheets—Sheet 1.

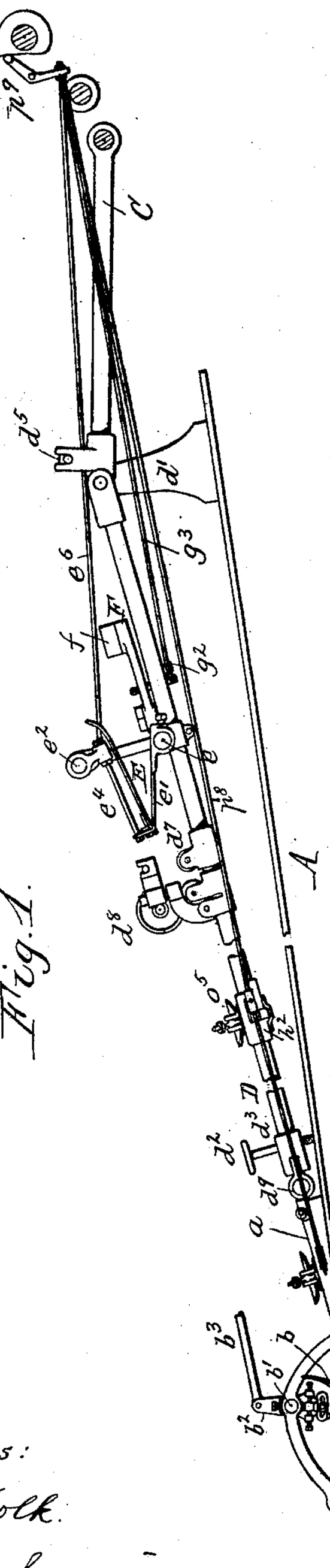

Fig. 1.

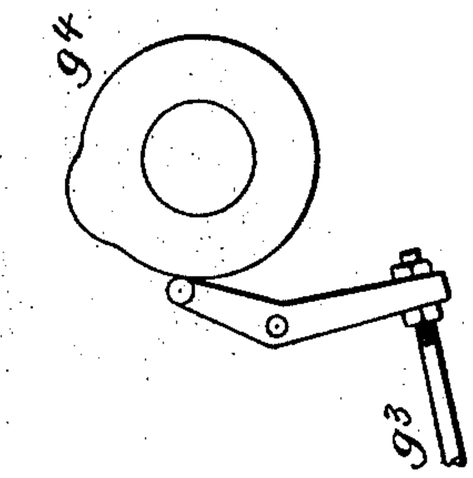

Fig. 4.

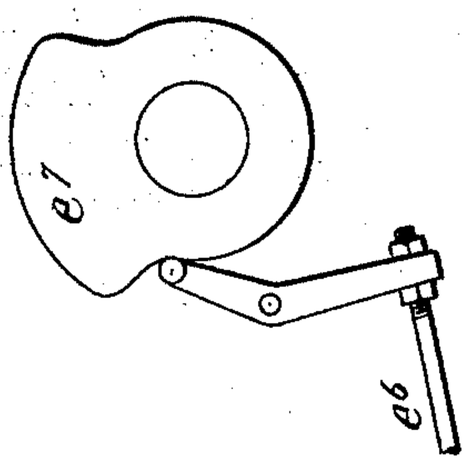

Fig. 3.

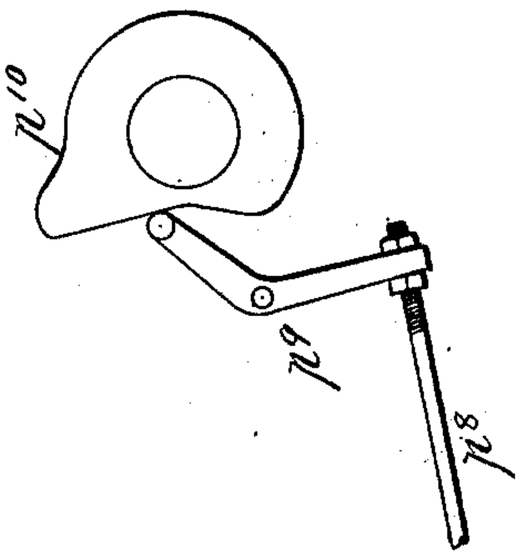

Fig. 2.

Witnesses:

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Geo. R. Williams
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(Application filed Aug. 12, 1901.)

(No Model.) 6 Sheets—Sheet 2.

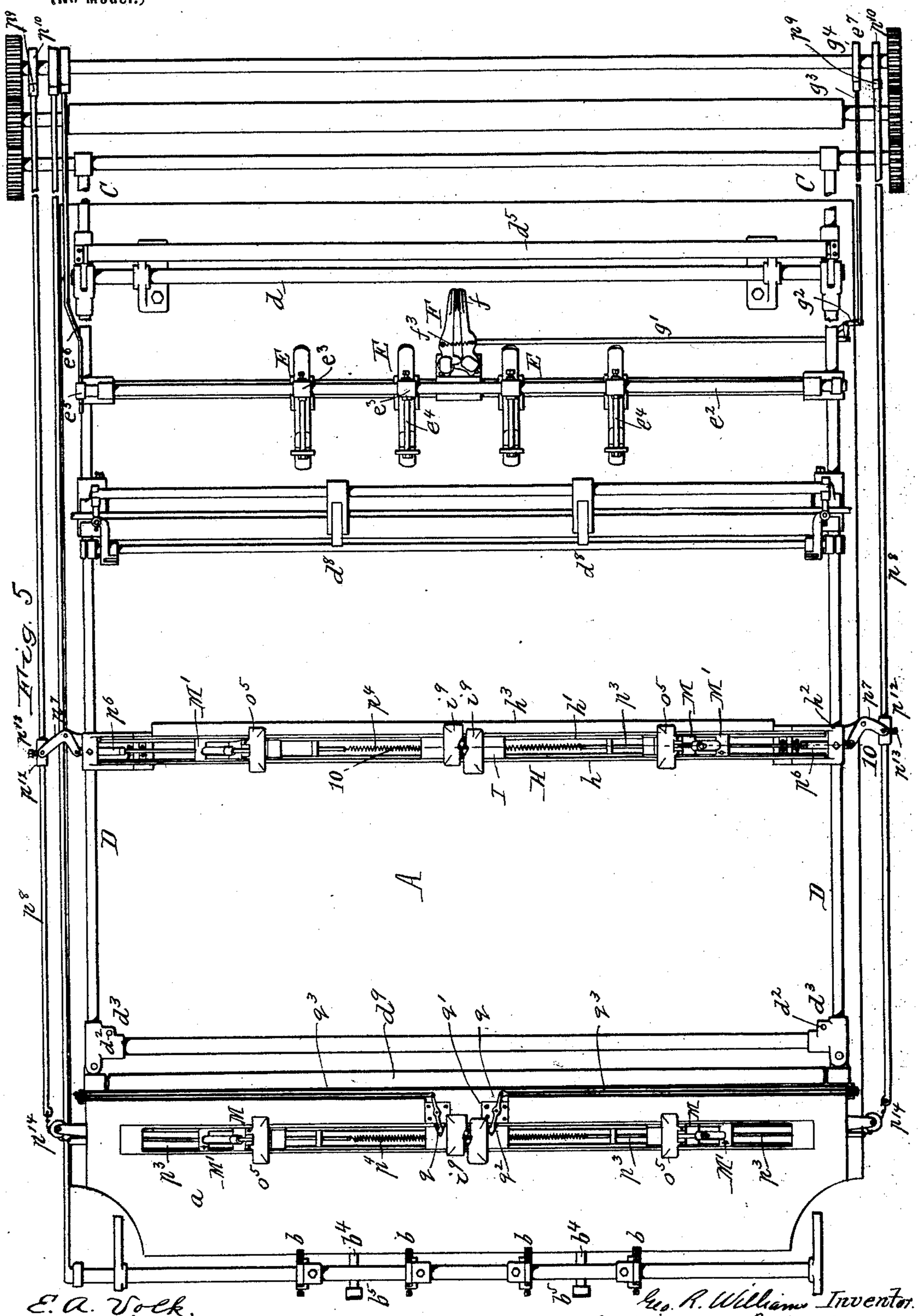

Fig. 5.

Witnesses.
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PAPER FEEDING MACHINE.

(Application filed Aug. 12, 1901.)

(No Model.) 6 Sheets—Sheet 3.

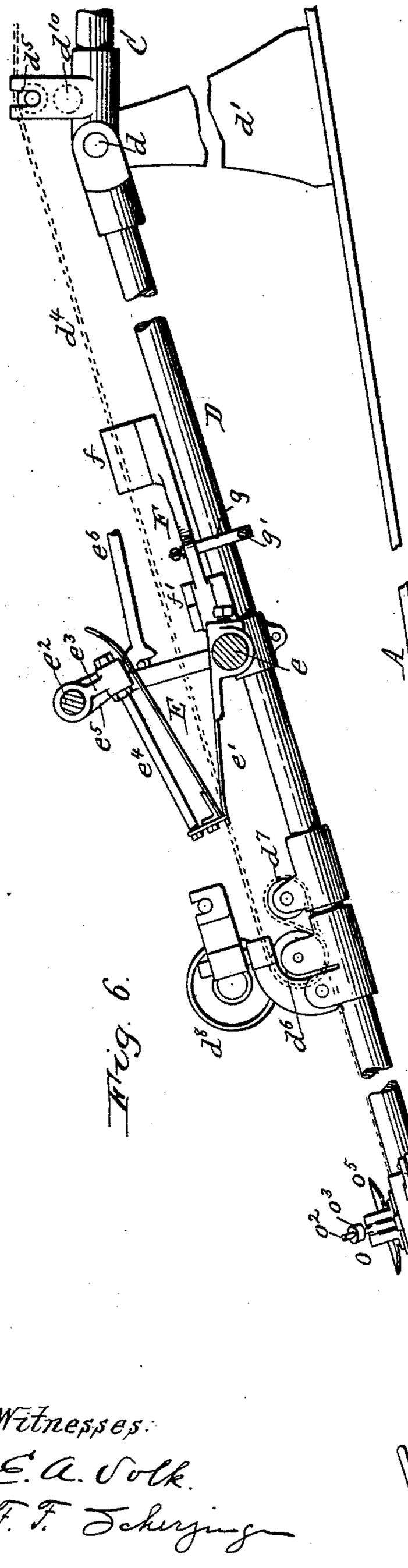

Fig. 6.

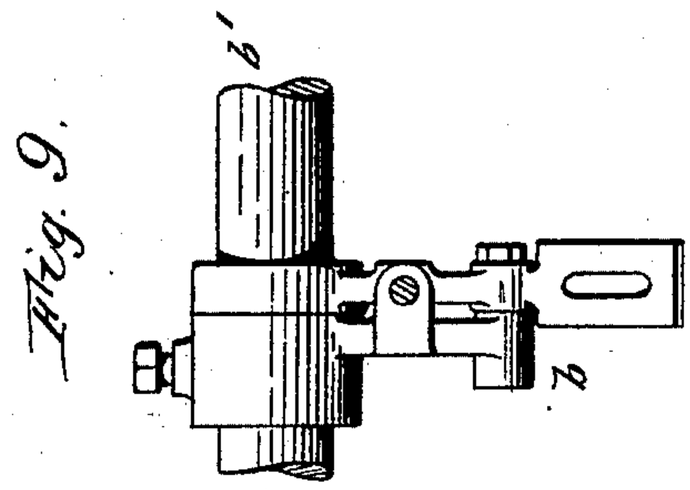

Fig. 9.

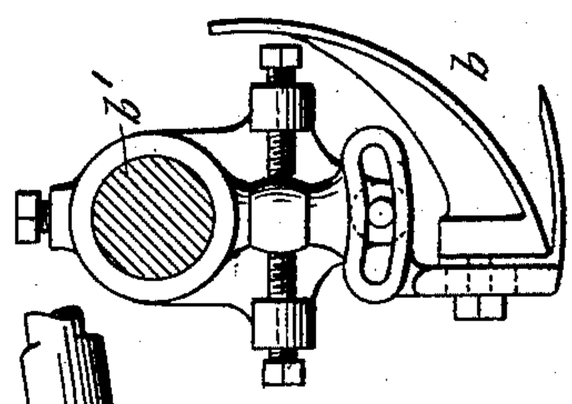

Fig. 8.

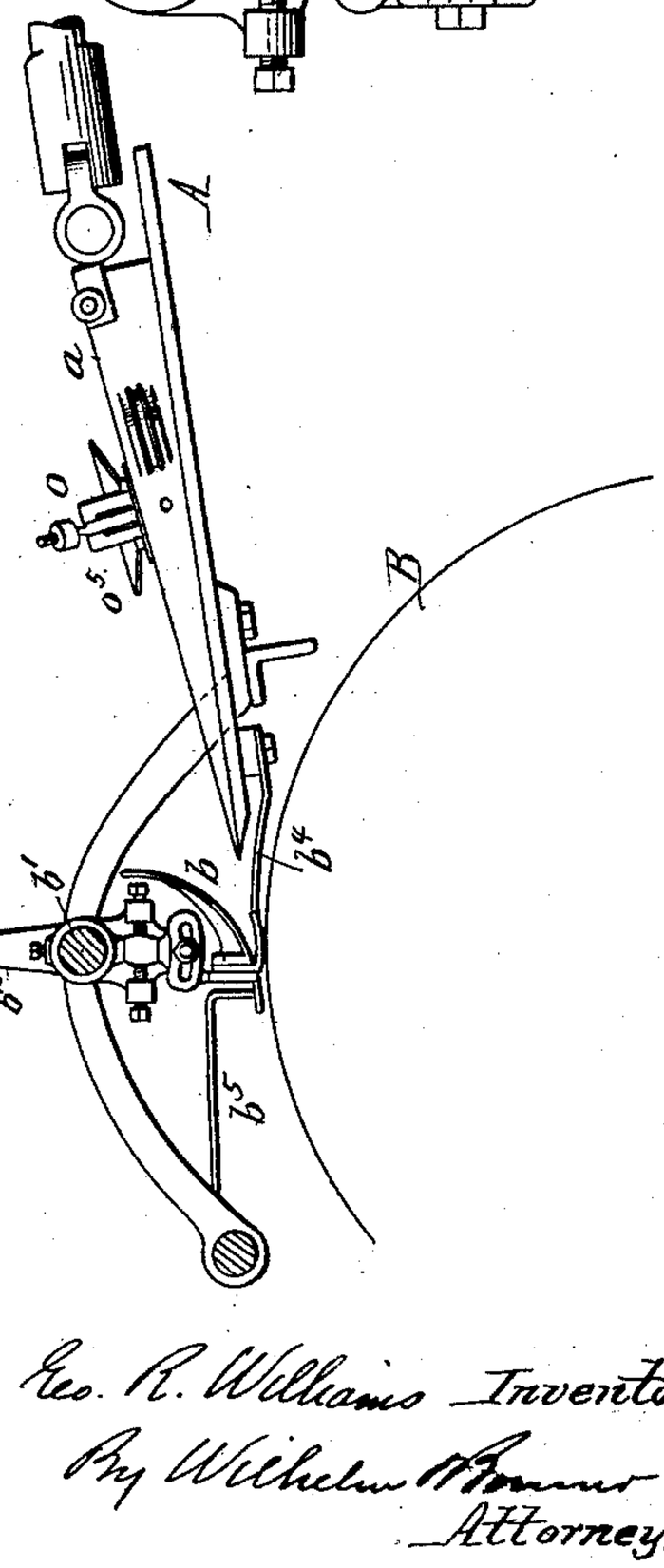

Fig. 7.

Witnesses:
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PAPER FEEDING MACHINE.

(Application filed Aug. 12, 1901.)

(No Model.) 6 Sheets—Sheet 4.

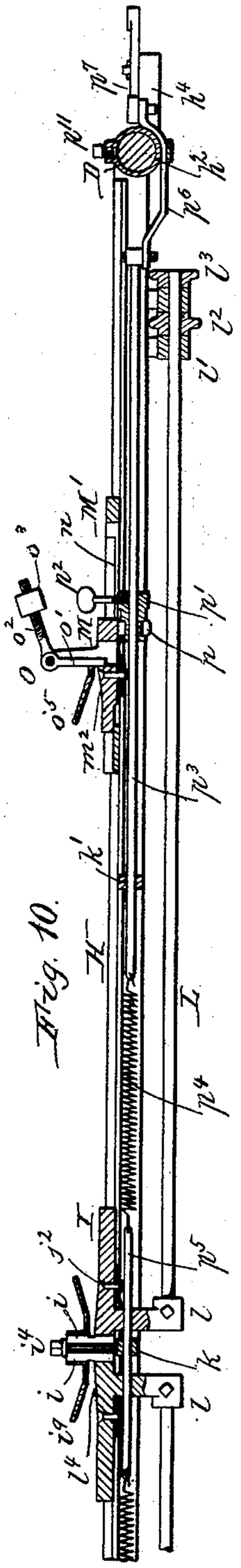

Fig. 10.

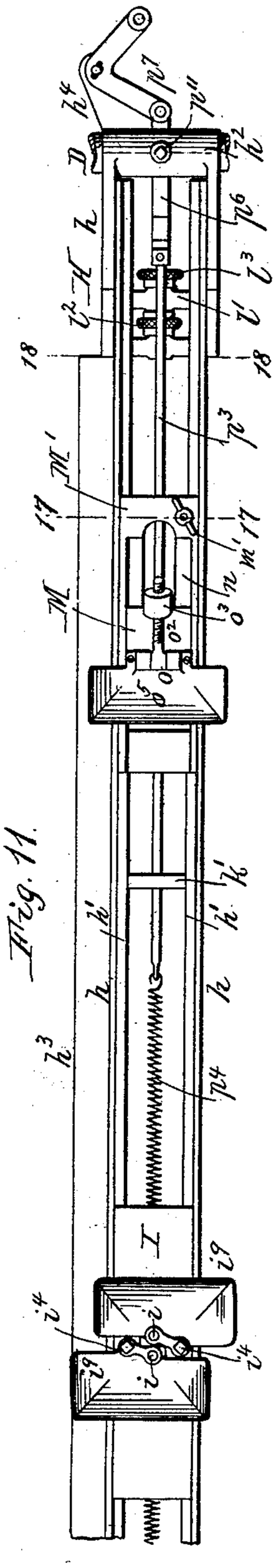

Fig. 11.

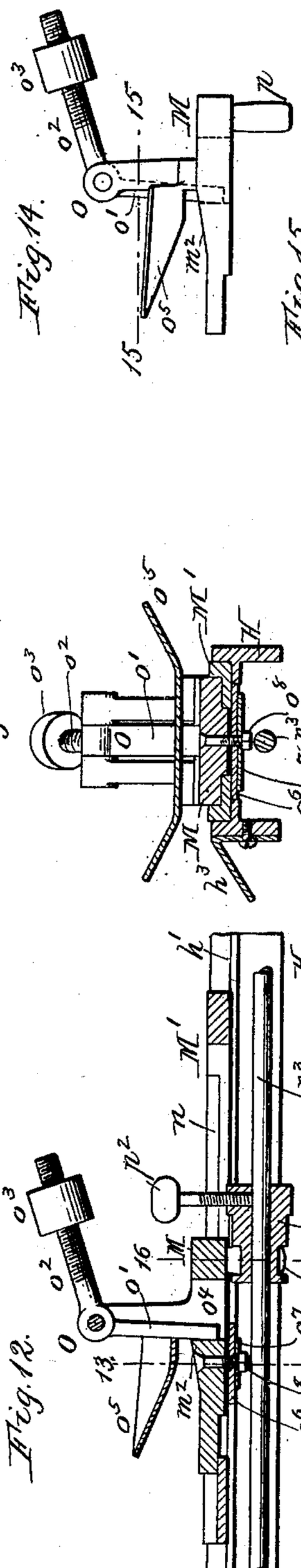

Fig. 12.

Fig. 13.

Fig. 14.

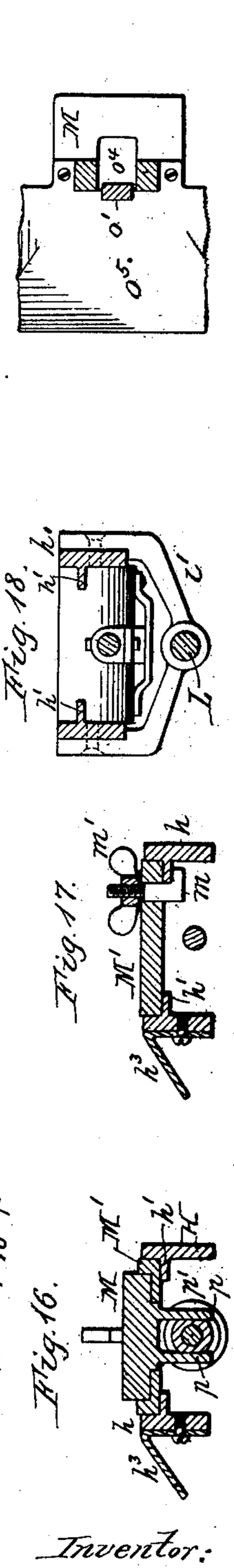

Fig. 15.

Fig. 18.

Fig. 17.

Fig. 16.

Witnesses.
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No. 714,847. Patented Dec. 2, 1902.

G. R. WILLIAMS.

PAPER FEEDING MACHINE.

(Application filed Aug. 12, 1901.)

(No Model.) 6 Sheets—Sheet 5.

Fig. 19.

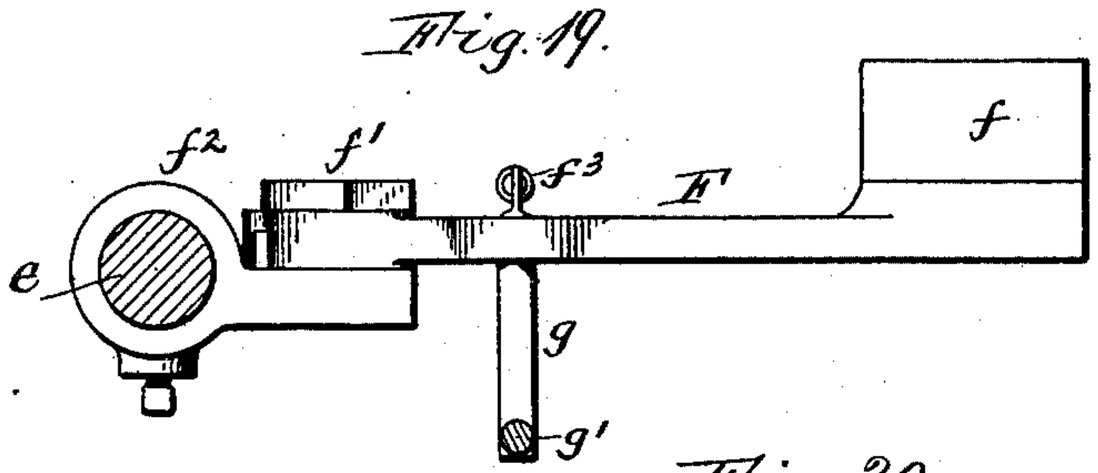


Fig. 20.

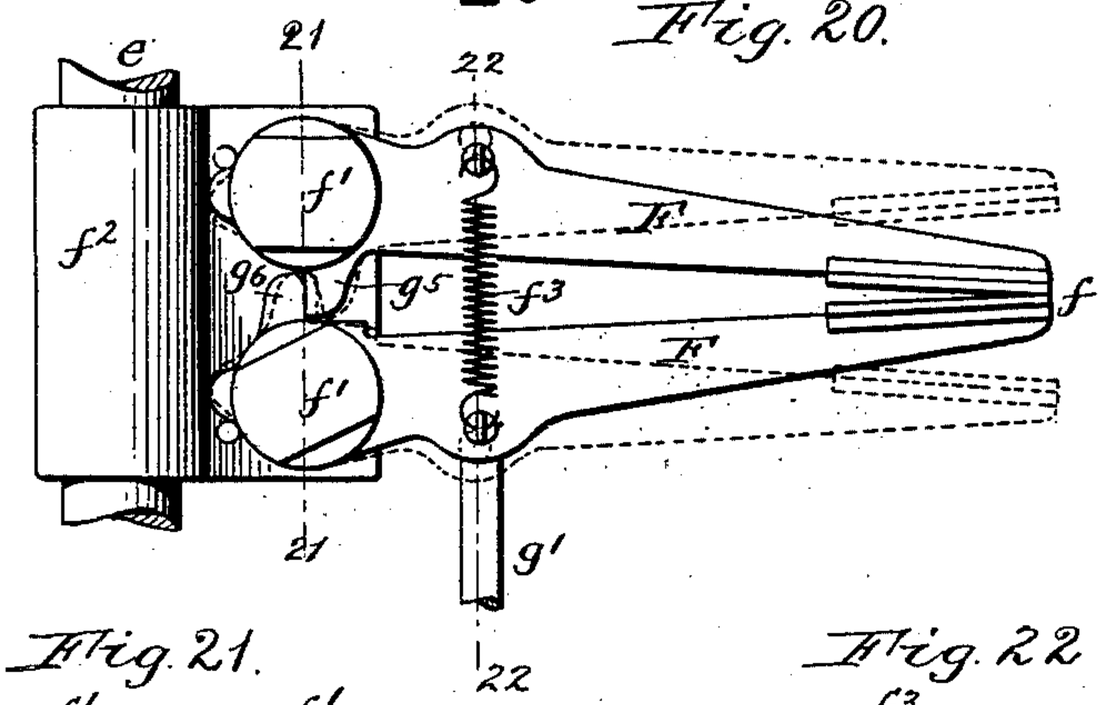


Fig. 21.

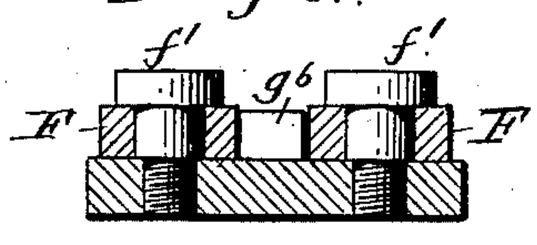


Fig. 22.

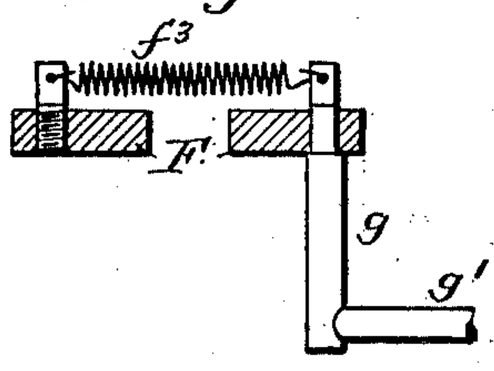


Fig. 23.

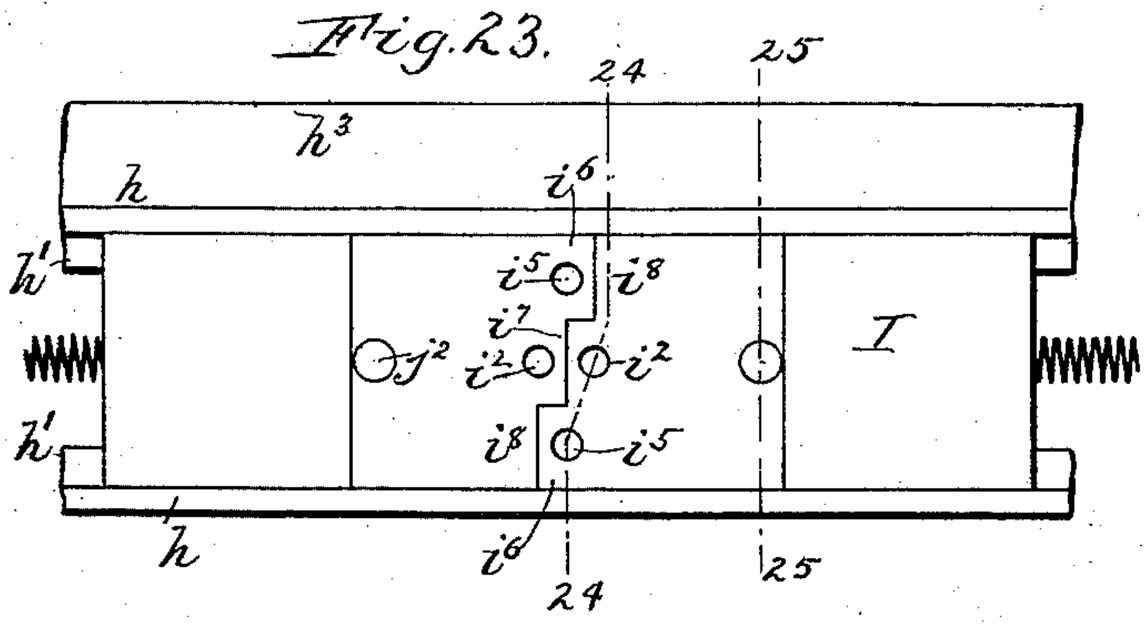


Fig. 24.

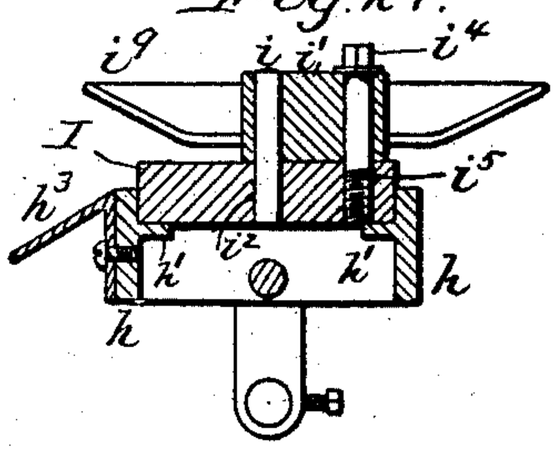


Fig. 25.

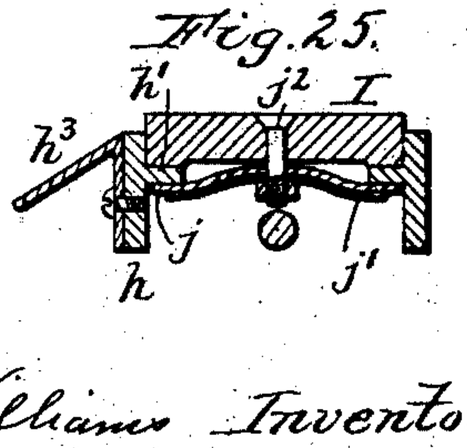
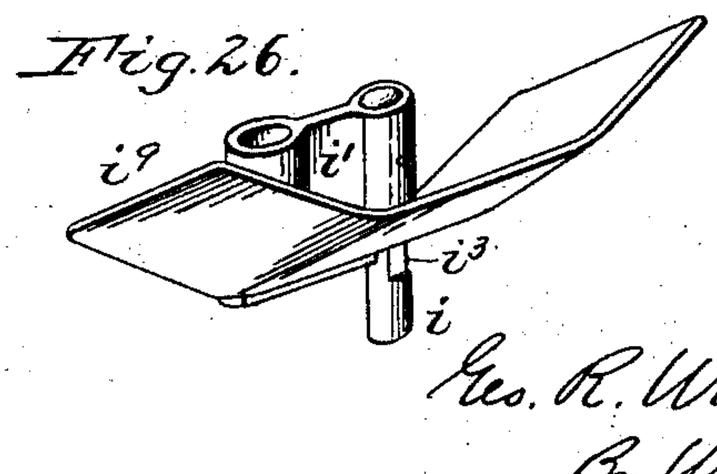


Fig. 26.



Witnesses:
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PAPER FEEDING MACHINE.

(Application filed Aug. 12, 1901.)

(No Model.) 6 Sheets—Sheet 6.

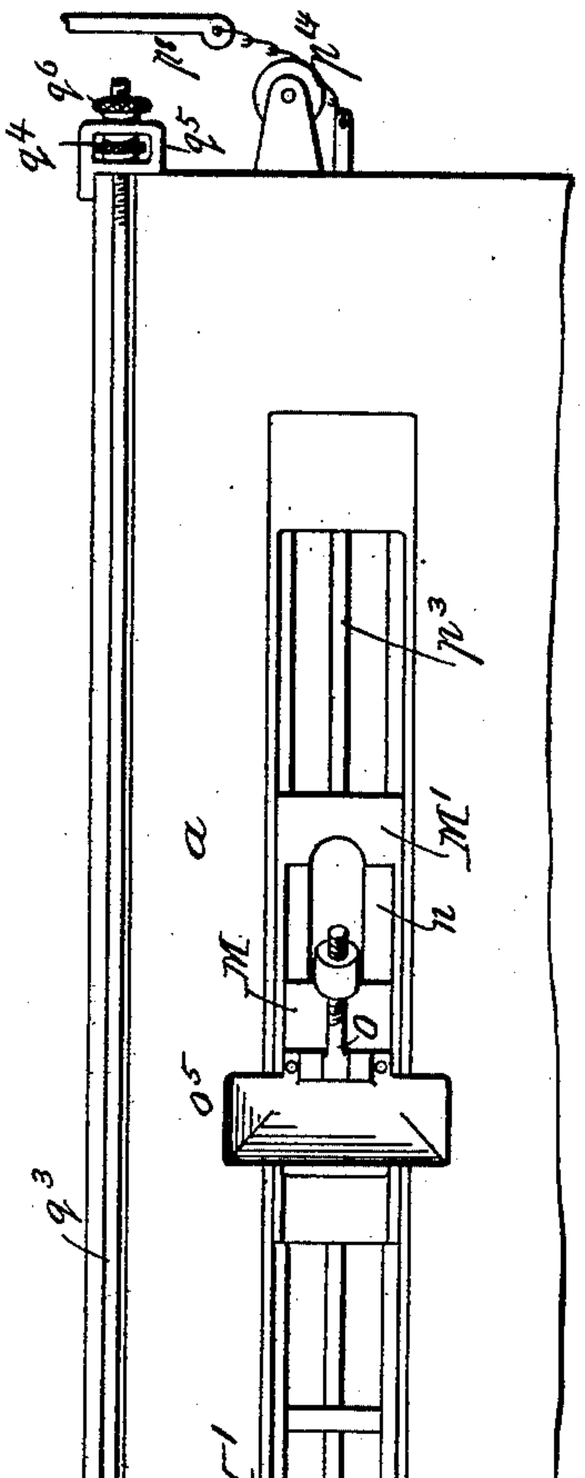

Fig. 27.

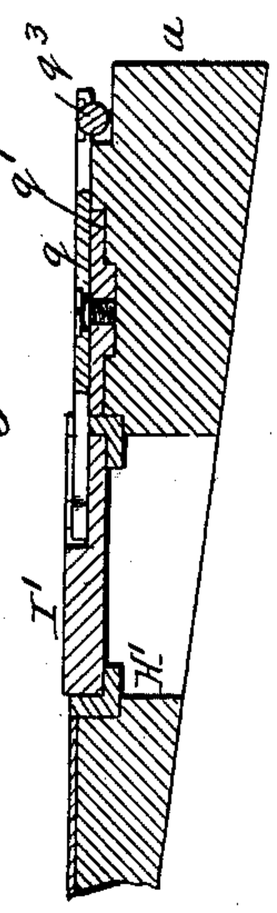

Fig. 28.

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UNITED STATES PATENT OFFICE.

GEORGE R. WILLIAMS, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE ECONOMIC MACHINE COMPANY, OF NEW YORK, N. Y.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 714,847, dated December 2, 1902.

Application filed August 12, 1901. Serial No. 71,743. (No model.)

To all whom it may concern:

Be it known that I, GEORGE R. WILLIAMS, a citizen of the United States, residing at New York, in the borough of Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Paper-Feeding Machines, of which the following is a specification.

This invention relates to that class of side registers which are employed between a paper-feeding machine and a printing-press or other machine to which the sheets are fed for placing the sheets in correct side register before they pass to the printing-press or other machine.

It is often desirable to feed two small sheets simultaneously side by side to a printing-press in order to utilize the full capacity of a large press when working on small sheets.

The main object of this invention is the production of an efficient and simple mechanism by which two sheets which are fed simultaneously side by side are side-registered by pushing the sheets inwardly against fixed registers arranged near the longitudinal center line of the feed-board.

In the accompanying drawings, consisting of six sheets, Figure 1 is a side elevation of my improved side-registering mechanism. Fig. 2 is a side elevation of the cam for operating the push devices. Fig. 3 is a side elevation of the cam for operating the preliminary front guides. Fig. 4 is a side elevation of the cam for operating the spreader device. Fig. 5 is a plan view, on an enlarged scale, with portions of the longitudinal members of the carrying-frame and other parts broken away to shorten the figure. Fig. 6 is a partly sectional side elevation of the carrying-frame, on an enlarged scale, shortened by breaking away parts of the longitudinal members. Fig. 7 is a side elevation of the slant board and connecting parts arranged at the inner end of the carrying-frame. Fig. 8 is a sectional side elevation of one of the front guides on an enlarged scale. Fig. 9 is an end elevation thereof. Fig. 10 is a fragmentary longitudinal section transversely of the carrying-frame through the upper side-registering mechanism in line 10 10, Fig. 5, on an enlarged scale. Fig. 11 is a top plan view thereof. Fig. 12 is a longitudinal sectional elevation of one of the push devices on an enlarged scale. Fig. 13 is a transverse sectional elevation thereof in line 13 13, Fig. 12. Fig. 14 is a side elevation thereof. Fig. 15 is a horizontal section thereof in line 15 15, Fig. 14. Fig. 16 is a transverse section in line 16 16, Fig. 12. Fig. 17 is a transverse section through the guide-plate of the push device and supporting parts in line 17 17, Fig. 11, on a enlarged scale. Fig. 18 is a transverse sectional elevation through the adjusting device of the center register in line 18 18, Fig. 11, on an enlarged scale. Fig. 19 is a side elevation of the spreader device on an enlarged scale. Fig. 20 is a top plan view thereof. Fig. 21 is a cross-section in line 21 21, Fig. 20. Fig. 22 is a cross-section in line 22 22, Fig. 20. Fig. 23 is a top plan view of the base-plates of the center registers on an enlarged scale. Fig. 24 is a vertical section through one of the center registers in line 24 24, Fig. 23. Fig. 25 is a vertical cross-section through the attaching-bolt of the center register in line 25 25, Fig. 23. Fig. 26 is a perspective view of one of the center-register pins and supporting parts. Fig. 27 is a fragmentary top plan view of the slant board and the side-registering devices supported by the same. Fig. 28 is a fragmentary cross-section in line 28 28, Fig. 27, on an enlarged scale.

Like letters of reference refer to like parts in the several figures.

A, Figs. 1, 5, 6, and 7, represents the main feed-board of a printing-press or other machine to which sheets of paper are fed.

a represents the usual auxiliary feed-board or slant board, which is arranged upon the lower portion of the main feed-board and adjacent to the cylinder B of the printing-press to which the sheets are fed.

b represents oscillating front guides secured to a rock-shaft b', which is actuated in the usual way by a rock-arm b^2 and rod b^3 from a cam. (Not shown.) These front guides are of well-known construction (shown in detail in Figs. 7, 8, and 9) and are arranged beyond the delivery end of the slant board in the path of the sheets. Two of these guides are arranged on each side of the center line of the slant board in order to form a reliable front guide against which the front edge of the sheet is squared.

b^4, Figs. 5 and 7, represents the usual under guides which are secured to the under side of the slant board and project rearwardly therefrom beyond the front guides b.

b^5 represents the usual drop-guides of the press, which are arranged with their front ends over the rear ends of the under guides slightly in rear of the front guides b, so that when the front guides b are swung backwardly and upwardly out of the way of the two sheets which have been squared against the same the sheets will be moved against the drop-guides and be arrested by the latter and held until the drop-guides are raised by the press mechanism in the usual way releasing the sheets and allowing the grippers of the press-cylinder to seize and remove the sheets. An under guide and a drop-guide are arranged on each side of the slant board between the two oscillating front guides b, as clearly shown in Fig. 5.

C, Figs. 1, 5, and 6, represents the delivery end of the frame of a paper-feeding machine of that type by which sheets of paper are successively fed off. The sheet-feeding mechanism is not shown and can be of any suitable or well-known construction.

D represents the side bars of the frame of the sheet-carrying mechanism, which is interposed between the paper-feeding machine and the slant board a and which supports the rollers of the carrying-tapes and other parts in a well-known manner. This frame is arranged in an inclined position above the main feed-board A and is supported at its upper end by its cross-bar d, resting in standards d' on the feed-board A, and at its lower end by set-screws d^2, arranged in the lower corner pieces d^3 of the frame and resting upon the lower portion of the feed-board, Figs. 1, 5, and 6. The carrying-tapes d^4 are shown in dotted lines in Fig. 6 and pass in the usual way over a tape-roller d^5 at the delivery end of the feeder-frame C, around intermediate lapping-rollers d^6 d^7, underneath pressure-rollers d^8, around a delivery-roller d^9, and back over a roller d^{10} underneath the roller d^5.

e represents a cross-bar which connects the side bars D of the carrying-frame between the upper ends of these side bars and the intermediate lapping-rollers. e' represents under guides, which are secured to this bar and which project rearwardly and upwardly therefrom to the level of the carrying-tapes, as shown in Fig. 6. E represents preliminary front guides, which are arranged above these under guides e' and which arrest and square the sheets after the tapes have taken control of the sheets. The tension of the carrying-tapes is usually somewhat different in the individual tapes, the inner tapes being not quite as tight as the outer tapes by reason of the springing of the rollers and other causes, and the carrying effect of the inner tapes is therefore somewhat less than that of the outer tapes. When two sheets are fed side by side by such tapes, the outer portion of each sheet, which is in control of the outer tapes, travels slightly faster than the inner portion, and the sheet is liable to be turned more or less out of its true position. Furthermore, in feeding two sheets simultaneously one of them is sometimes fed slightly in advance of the other. These difficulties or imperfections of feeding are rectified by the preliminary front guides E, which arrest, square, and aline the sheets before the latter are presented to the side-registering devices. These preliminary front guides may be constructed and operated in various ways. As shown in Figs. 1, 5, and 6, these guides are attached to a rock-shaft e^2 by depending arms e^3 and rods e^4, extending rearwardly from the arms to the rear ends of the guides, the latter projecting forwardly on the under side of the arms and rods. The rock-shaft e^2 is operated by a rock-arm e^5, rods e^6, and cam e^7, Figs. 1, 3, and 5, in such a way that the guides are swung backwardly and upwardly at the proper time to release the sheets. Two or more of these preliminary front guides are preferably arranged on each side of the center line of the carrying-frame or feed-board for squaring the sheet passing forwardly on that side of the frame.

My improved side-registering mechanism is so constructed that each sheet is side-registered by being pushed inwardly against a fixed registering-stop arranged near the longitudinal center line of the feed-board. Two sets of these inner stops are preferably employed, one for each sheet, and each stop is separately adjustable. These stops project above the carrying-surface of the tapes and might be struck by the sheets if the latter travel too closely together. In order to prevent the sheets from so traveling and to insure a sufficient distance between the inner side edges of the two traveling sheets to clear these center stops, spreading devices are preferably employed by which the sheets are spread or moved laterally and outwardly on the tapes before they reach the side-registering mechanism, such outward movement being of the necessary extent to enable the inner edges of the sheets to clear the center stops and so short that the outer edges of the sheets remain within the push devices, which engage against the outer edges of the sheets and push the latter against the center stops. These spreading devices are shown in Figs. 1, 5, 6, 19, and 22 and are constructed as follows: F represents two spreading-arms, which are arranged lengthwise side by side below the surface of the carrying portions of the tapes in front of the preliminary front guides E on opposite sides of the longitudinal center line of the carrying-frame. These spreading-arms are provided at their front ends with upright spreading-plates f, which project above the carrying-tapes and are adapted to strike against the inner edges of the two sheets when these plates are moved away from each other. These two arms are pivoted at their rear ends by bolts f' to a sup-

porting-sleeve f^2, which is secured to the central portion of the transverse rod e of the carrying-frame. The arms project from their pivots toward the paper-feeder and stand in their normal position with the spreading-plates closely together, as shown in Figs. 5 and 20, so that the two sheets pass forwardly on opposite sides of these plates. The two arms are yieldingly held in this closed position by a connecting-spring f^3. Upon opening this spreading device by swinging its two arms apart, as indicated in dotted lines in Fig. 20, the plates strike against the inner edges of the two sheets and move the latter outwardly if the sheets are too closely together, while when the sheets are at the proper distance apart they are not struck by the spreading device. The range of movement of the latter is such that the sheets are spread a sufficient distance to insure their clearing the center stops of the side-register mechanism while remaining within the push devices. The spreading device is quickly opened and closed when the sheets have been stopped by the preliminary front guides E. The mechanism for this purpose may be of any suitable construction. That which is shown in the drawings consists of the following parts: g represents a pin which extends downwardly from one of the arms F, and g' is a rod which extends outwardly from this pin and connects with an elbow-lever g^2, which is operated by a rod g^3 from a cam g^4 on the paper-feeder, Figs. 4 and 5. g^5 g^6 represent teeth projecting inwardly from the hub portions of the spreading-arms and bearing against each other in such manner that when the arm to which the rod g' is connected is swung outwardly by said rod such movement is communicated by the teeth to the other arm, so that both arms and their spreader-plates are swung out simultaneously. The arms are returned to their closed position by the spring f^3 when they are released by the cam.

The side-registering mechanism comprises two sets of registering devices—an upper or front set, which is arranged on the carrying-frame D between the lapping-rollers and the slant board, and a lower or rear set, which is arranged on the slant board. Each of these sets of registering devices is composed of two inner or center stops, which are stationary, but adjustable laterally, and outer laterally-moving push devices whereby the sheets are pushed inwardly against these center stops. The registering devices, which are arranged on the carrying-frame, are shown most clearly in Figs. 5, 10 to 18, 23 to 26 and are constructed as follows: H represents a narrow transverse frame which extends between the side bars D of the carrying-frame and which is composed of transverse guide-bars h, having inner guide ledges or shoulders h' and end sleeves h^2, by which the guide-bars are supported on the side bars of the carrying-frame. This frame is provided along its upper edge—that is to say, the edge which is first reached by the sheets of paper—with an inclined plate h^3, by which the tapes and the sheets are guided to the level of the frame. I represents the supporting or base plates of the inner stationary registering-stops. These plates are arranged between the guide-bars h of the frame H upon the guide-ledges h' and are capable of adjustment inwardly and outwardly. The registering-stops are formed by upright pins i, which are preferably made of hard steel to better stand the wear resulting from the edges of the sheets striking the stops. Each of these pins is secured in a head i' and project downwardly from the head into an opening i^2 near the inner end of the base-plate I, Figs. 10, 11, 23, and 24. The registering-pin is provided on its outer side with a flat registering-face i^3, against which the inner edge of the sheet is registered. The head i' is secured to the underlying base-plate I by a screw i^4, which passes through the head into a threaded opening i^5 in the plate. The adjacent inner ends of the two plates are preferably formed with overlapping steps or shoulders i^6 i^7 i^8. The screw-hole i^5 is formed in the innermost step i^6 of each plate, and the hole for the reception of the stop-pin in the next outer or middle step i^7, so that each head i' stands obliquely at the inner end of the plate. This oblique or lapping joint of the two plates permits the heads and registering-pins to be arranged very closely together and reduces the space required between the inner edges of the two sheets to a minimum. Each of the heads is provided on its outer side above the registering-face of the pin with a guide-shield i^9, which is curved, so as to rise forwardly, outwardly, and backwardly in order to guide the inner edge of the sheet against the registering-stop. Each of the base-plates I is frictionally held down upon the guide-ledges of the frame H by some suitable device, which permits the plates to be moved in or out of the frame for adjusting the position of the stops. The devices shown for this purpose in the drawings consist of a spring-plate j and washer j', which are secured by a screw-bolt j^2 to the base-plate. The upper spring-plate j bears with its ends against the under sides of the guide-ledges h' and the lower spring-plate or washer rests against the upper plate j, as shown in Figs. 10 and 25. The side bars h of the frame H are connected by a middle cross-piece k and intermediate cross-pieces k'. Each base-plate I is provided with a downwardly-projecting lug l, to which the inner end of an adjusting-rod L is secured, which extends outwardly underneath the frame H. The outer end portion of this adjusting-rod is screw-threaded and passes through a divided depending bearing l', in which is arranged a screw-nut l^2, which is held against longitudinal movement between the two parts of the bearing, Figs. 10, 11, and 18. By turning this nut the adjusting-rod L is moved in or

out, and the plate I and the registering-stop secured thereto are thereby adjusted. This divided bearing and screw-nut are arranged near each outer end of the transverse frame H, where the nut can be conveniently reached by the operator. The adjusting-rod L is preferably clamped in its adjusted position by a jam-nut l^3, applied to the outer end of the adjusting-rod and engaging against the outer side of the divided bearing. This adjusting mechanism permits the inner stops to be conveniently adjusted from the outer side of the carrying-frame D.

The two sheets which travel forwardly on the tapes on opposite sides of the two center stops are pushed against these stops for side-registering the sheets by push devices which are constructed as follows: M, Figs. 5 and 10 to 16, is a reciprocating carrier-plate which is arranged to slide inwardly and outwardly on a guide-plate M′, secured between the side bars h of the transverse frame H upon the ledges h' thereof. This guide-plate is clamped to the frame H by one or more hook-bolts m, one of said bolts being shown, which engages with its hook-shaped head against the under side of one of these ledges and passes through the guide-plate and is provided above the same with a thumb-nut m'. This plate is provided on its upper side with depressed ways n, which are arranged parallel with the frame H and in which the reciprocating plate M moves back and forth. This reciprocating plate carries two standards, between which is pivoted a push-finger O, adapted to engage against the outer edge of the sheet and push the sheet inwardly against the center stop. As shown, this finger has the form of an elbow-lever having its inner arm o' between the standards, while its upper arm o^2 projects outwardly and is provided with a weight o^3, which is adjustable toward and from the fulcrum of the lever. The lower end of the depending inner arm of the lever plays in an opening o^4 in the sliding plate M and is normally held against the inner end of this opening by the overhanging weight on the upper arm of the lever, in which position of the lever the inner arm stands inwardly of the standards of the sliding plate. The inner arm of this lever forms the part of the push-finger which comes in contact with the outer edge of the sheet and by which the sheet is pushed inwardly against the center stop. As this lever is yielding it adapts itself to the sheet and does not crumple or injure the latter in pushing the sheet against the fixed inner stop, the registering being effected against the fixed inner stop and not against the yielding outer push-finger. o^5 represents a guide-shield which is secured to the standards above the sliding plate M and which rises forwardly, inwardly, and backwardly from the standards. This shield is provided with an opening which coincides with the opening in the sliding plate and permits the free play of the inner arm of the elbow-lever. The upper surface of each sliding plate M is preferably slightly raised toward the elbow-lever, as shown at m^2, Figs. 10 and 12, to raise said surface to the level of the tapes near the push-finger, the main portion of the surface of the sliding plate being below the level of the tapes. The upper surface of each base-plate I of the center stops is similarly raised, as shown at l^4, Fig. 10. Each of the sliding plates M is frictionally held down upon the guide-plate upon which it moves by a spring-plate o^6, washer o^7, and bolt o^8, Figs. 12 and 13.

The reciprocating carrier-plates of the two push devices are simultaneously moved inwardly and outwardly by an actuating mechanism of any suitable description, the mechanism shown in the drawings, most clearly in Figs. 5 and 10 to 16, being constructed as follows: p represents two lugs which project downwardly from the outer portion of each reciprocating plate and which straddle the reduced neck of a sleeve p', which is secured by a set-screw p^2 to a horizontal actuating-rod p^3. This rod is arranged longitudinally between the lower portions of the side bars h of the frame H and is connected at its inner end to a spring p^4, which is secured to a stationary part—for instance, a rod p^5—fastened in the center cross-piece k of the frame H. This spring tends to draw the actuating-rod inwardly. The rod is connected at its outer end by a bent bar p^6, extending outwardly underneath the attaching-sleeve h^2, with an elbow-lever p^7 pivoted upon an ear h^4 on this sleeve. This elbow-lever is connected by a rod p^8 to a cam mechanism, by which the rod is moved outwardly at the proper time and then allowed to move back under the action of the spring. This cam mechanism is composed of a rock-lever p^9 and a cam p^{10}, mounted on a suitable shaft of the paper-feeder, Figs. 1, 2, and 5. The reciprocating plate carrying the push-finger is moved outwardly by this mechanism before the sheet is fed past the push device and moves outwardly far enough to allow the outer edge of the sheet to pass forwardly on the inner side of the push-finger. When the sheet has been so fed forwardly and has come to a stop against the front guides b and has been squared by the same, the push device is released by the cam and moved inwardly by the spring. During this inward movement of the push device the push-finger O strikes the outer edge of the sheet and pushes the sheet inwardly against the registering-face of the center stop.

The attaching-sleeves h^2 of the frame H are adjustable on the side bars D of the carrying-frame, so that the frame H, carrying the upper registering devices, can be adjusted toward and from the lower registering devices on the slant board a as the size of the sheets may require. The attaching-sleeves are secured in position by set-screws p^{11}, and the elbow-levers p^7 are adjustably secured to the rods p^8 by attaching-sleeves p^{12}, which

can be adjusted lengthwise on the rods and which are secured by set-screws p^{13}.

The push devices require to be adjusted laterally on the feed-board and carrying-frame with reference to the width of the sheets operated upon. For a small adjustment it is only necessary to release the set-screw p^2 and shift the reciprocating plate M on the supporting guide-plate M'. For a considerable adjustment the supporting-plate M' is also adjusted on the frame H by releasing the hook-bolt m and shifting the plate M' on the frame H inwardly or outwardly, the set-screw p^2 being released to allow the sleeve p' to be correspondingly shifted on the actuating-rod p^3. By adjusting the sliding plate M on the guide-plate M' the position of the push-finger can be nicely regulated with reference to the sheet, so as to push harder or more gently. By adjusting the sliding plate inwardly the action of the push-finger in buckling the sheet and pushing it against the fixed stop is increased, and by adjusting the finger outwardly this action is diminished.

The center registers and the push devices which are arranged upon the slant board are constructed and operated substantially like the center registers and push devices already described, which are arranged on the carrying-frame, the differences being in details which render one set of devices better adapted for connection with the frame and the other for connection with the slant board. The devices are most clearly represented in Figs. 5, 27, and 28 and are constructed as follows: H' represents the guide-frame, which is recessed or countersunk into the upper surface of the slant board a and which supports the center registers and the push devices. I' represents the base-plates of the center registers adjustably arranged upon the frame H'. These base-plates are each adjusted by a lever q, which is pivoted to a plate q', countersunk into the slant board on the upper side of the adjacent base-plate I'. The lever projects with its lower arm into a recess q^2, formed in the upper edge of the base-plate. The upper arm of the adjusting-lever q is connected to an adjusting-rod q^3, which extends outwardly in a recess formed in the upper portion of the slant board. The outer screw-threaded end of this rod is engaged by an adjusting-nut q^4, arranged in a divided bearing q^5, secured to the slant board, and the rod is held in its adjusted position by a jam-nut q^6. By moving this rod inwardly or outwardly the base-plate I' is moved outwardly or inwardly.

The actuating-rod p^3 of each push device is connected with the reciprocating plate M of the push device, as already described; but instead of being connected with an elbow-lever at its outer end it is connected with the rod p^8 by a chain p^{14}, as shown, or in some other suitable way, so that the rod p^8 operates both push devices on the same side of the machine simultaneously. The two push devices on the same side of the machine are in this manner moved outwardly and inwardly simultaneously and the two sets of push devices on opposite sides of the machine move outwardly and inwardly simultaneously, so that both sheets are registered at the same time.

In the operation of my improved side-registering mechanism the two sheets, which are simultaneously fed forward side by side, are first squared against the preliminary front guides E and are spread apart, if they should be too closely together. They are then released by these front guides and are carried forward by the tapes on opposite sides of the center registers and on the inner sides of the push devices and are squared against the front guides b. Each sheet is then pushed inward by the push devices against the corresponding two center registers facing outwardly and are registered against the same. During this inward or registering movement the two front registers b on the same side of the machine form a straight guide by which the sheet is held in its squared position during the registering movement, so that when the sheet has been registered with its inner edge against the two center registers facing it the sheet is in correct side register and rests with its front edge squarely against the front guides. The latter are now swung up to release the sheets and the sheets are moved forward by the tapes against the drop-guides, which stand at a short distance beyond the front guides b, so that there is no danger of disturbing the register by this short movement. The sheets are next released by the drop-guides and seized by the grippers and carried into the printing-press or other machine to which the sheets are fed. The parts of these registering and push devices which project above the plane in which the carrying portions of the tapes and the sheets move are detachable and can be readily removed when they are not required for use and the machine is to be used for feeding and registering single sheets by the devices ordinarily employed for that purpose.

The mechanical details of my invention can be varied in many ways without departing from the spirit of the invention, and I therefore do not wish to limit myself to such details.

I claim as my invention—

1. The combination of two sets of outwardly-facing center registers and two coöperating sets of inwardly-facing reciprocating push devices, whereby two sheets, which are fed side by side on opposite sides of said center registers, are pushed inwardly against said center registers and are side-registered against the same, substantially as set forth.

2. The combination of two sets of center registers, each set composed of outwardly-facing registers arranged longitudinally in line, and two corresponding sets of inwardly-facing reciprocating push devices, by which

two sheets fed on opposite sides of the center registers are pushed against the same and side-registered, substantially as set forth.

3. The combination of center registers, coöperating push devices arranged on opposite sides of said center registers, and mechanism whereby said push devices are simultaneously moved toward and from said center registers, substantially as set forth.

4. The combination of preliminary front guides, whereby two sheets fed side by side are squared, and a side-registering mechanism arranged in rear of said front guides and composed of center registers and coöperating push devices, arranged on opposite sides of said center registers, substantially as set forth.

5. The combination of a side-registering mechanism composed of center registers and coöperating outer push devices, and a spreading device whereby two sheets, which are fed side by side, are moved apart before reaching the side-registering mechanism to clear said center registers, substantially as set forth.

6. The combination of a side-registering mechanism composed of center registers and coöperating outer push devices, preliminary front guides, whereby two sheets fed side by side are squared before reaching said side-registering mechanism, and a spreading device whereby said sheets are moved apart to clear said center registers, substantially as set forth.

7. The combination of preliminary front guides whereby two sheets fed side by side are squared, a side-registering mechanism arranged in rear of said preliminary front guides and composed of center registers and coöperating outer push devices, main front guides against which the sheets rest with their front edges while being pushed against the center register, and drop-guides arranged in rear of said main front guides, substantially as set forth.

8. The combination of a side-registering mechanism composed of center registers and coöperating outer push devices, pivoted spreader-arms arranged in front of said center registers, mechanism whereby the arms are opened, and means for closing the arms, substantially as set forth.

9. The combination of a side-registering mechanism composed of center registers and coöperating outer push devices, pivoted spreader-arms arranged in front of said center registers and provided with engaging projections whereby the movement of one arm is transmitted to the other, mechanism connected with one of said arms for swinging the arms apart, and a closing spring connecting the arms, substantially as set forth.

10. The combination of a slant board, lower center registers and outer push devices arranged on the slant board, upper center registers and outer push devices arranged in front of the slant board, and a support on which said upper center registers and push devices are mounted and which is adjustable toward and from the slant board, substantially as set forth.

11. The combination of a slant board, center registers and outer push devices arranged on the slant board, a carrying-frame arranged in front of the slant board, a transverse guide-frame supported on the carrying-frame and made adjustable on the same toward and from the slant board, and center guides and outer push devices arranged on said transverse guide-frame, substantially as set forth.

12. In a side-registering mechanism, the combination of a fixed stop against which the sheet is pushed with one of its sides for registering the sheet, and a push device composed of a transverse guide, a slidable carrier which has a reciprocating movement on said guide, and a push-finger which is mounted on and moves with said carrier to bear against the opposite side of the sheet and push the sheet against the fixed stop, said push-finger being adapted to yield to prevent injury to the sheet, substantially as set forth.

13. A side-registering mechanism comprising a fixed stop against which the sheet is pushed with one of its sides for registering the sheet, and a push device which is movable toward and from said fixed stop and which is provided with a pivoted push-finger having a depending arm which engages the opposite side of the sheet and an outwardly-projecting weighted arm, substantially as set forth.

14. A side-registering mechanism comprising two fixed center stops, means whereby each of said stops can be independently adjusted in a lateral direction, and outer push devices which are movable toward and from said center stops, substantially as set forth.

15. A side-registering mechanism comprising two fixed center stops, a transverse guide-frame on which said stops are mounted, push devices mounted on said guide-frame outside of said center stops, and means for reciprocating said push devices on said guide-frame, substantially as set forth.

16. A side-registering mechanism comprising two fixed center stops, a transverse guide-frame on which said stops are adjustably mounted, adjusting-rods extending from said stops outwardly to the ends of said guide-frame, adjusting devices engaging the outer ends of said rods, and push devices arranged on said guide-frame outside of said center stops, substantially as set forth.

17. In a side-registering mechanism, fixed center stops composed of base-plates having overlapping inner ends, heads secured upon the adjacent inner portions of said base-plates and registering-pins secured to said heads and projecting into openings formed in said base-plates, substantially as set forth.

Witness my hand this 27th day of June, 1901.

GEORGE R. WILLIAMS.

Witnesses:
GEO. C. KIMBALL,
CHAS. H. LAMB.