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SHEET DELIVERY MECHANISM FOR PRINTING PRESSES.

APPLICATION FILED MAR. 18, 1910.

974,062.

Patented Oct. 25, 1910.

6 SHEETS—SHEET 1.

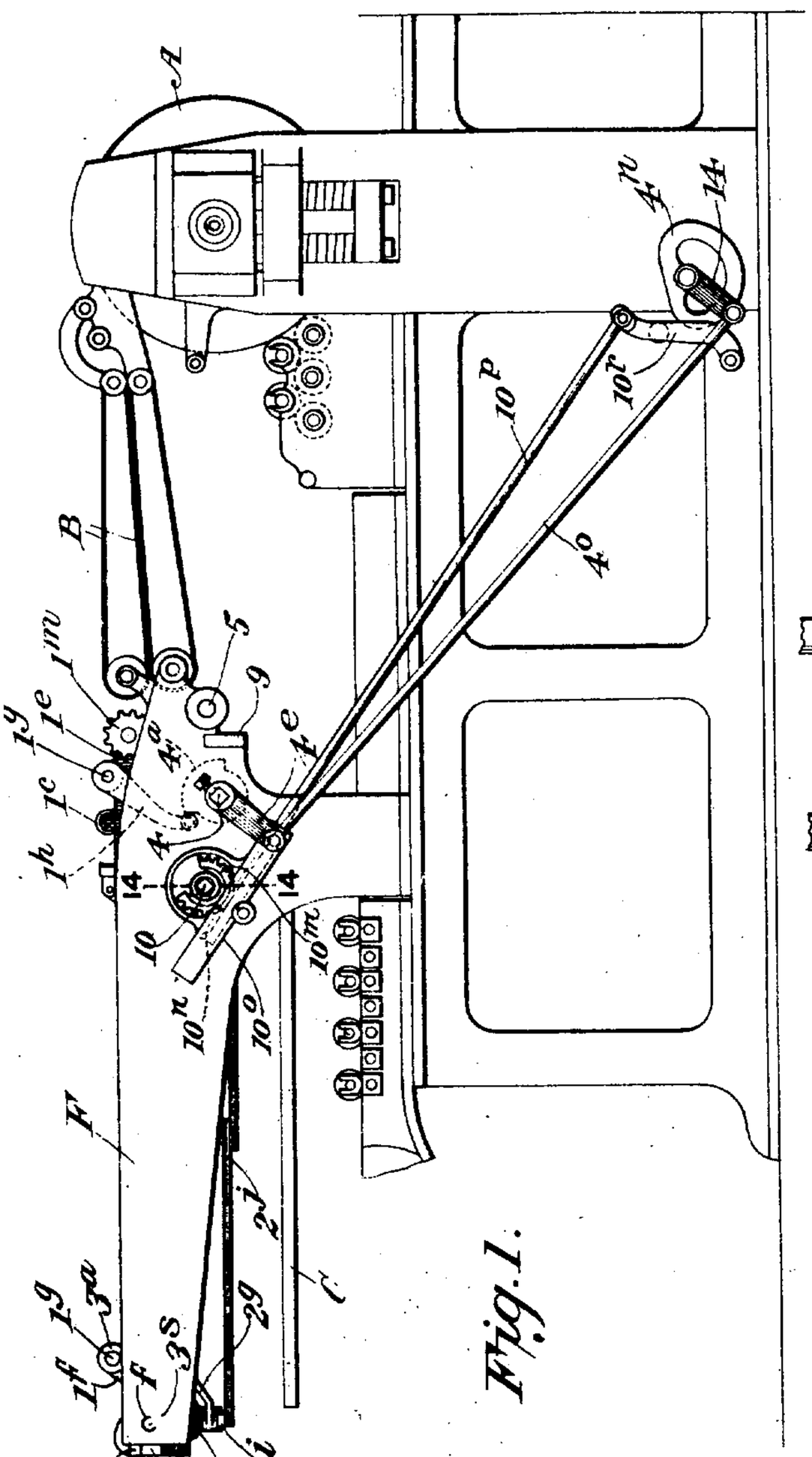

Fig. 1.

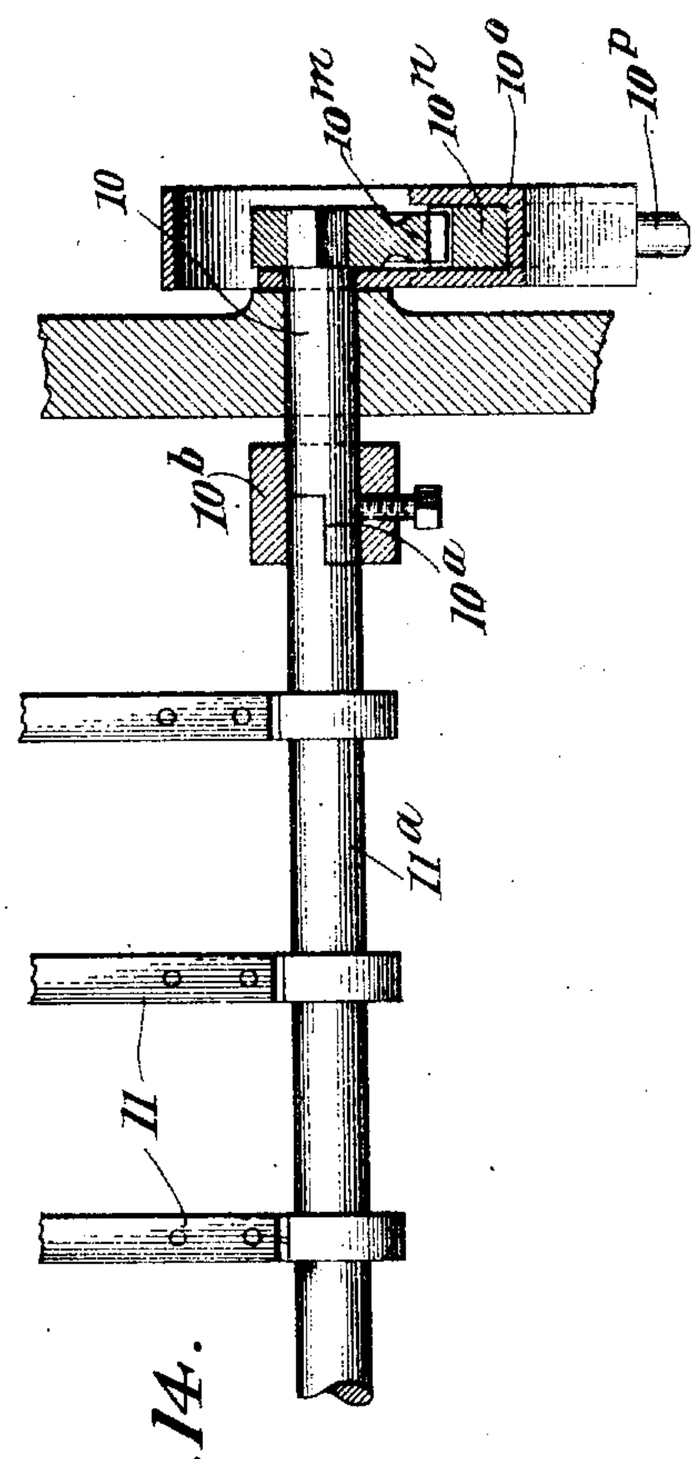

Fig. 14.

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Witnesses

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6 SHEETS—SHEET 2.

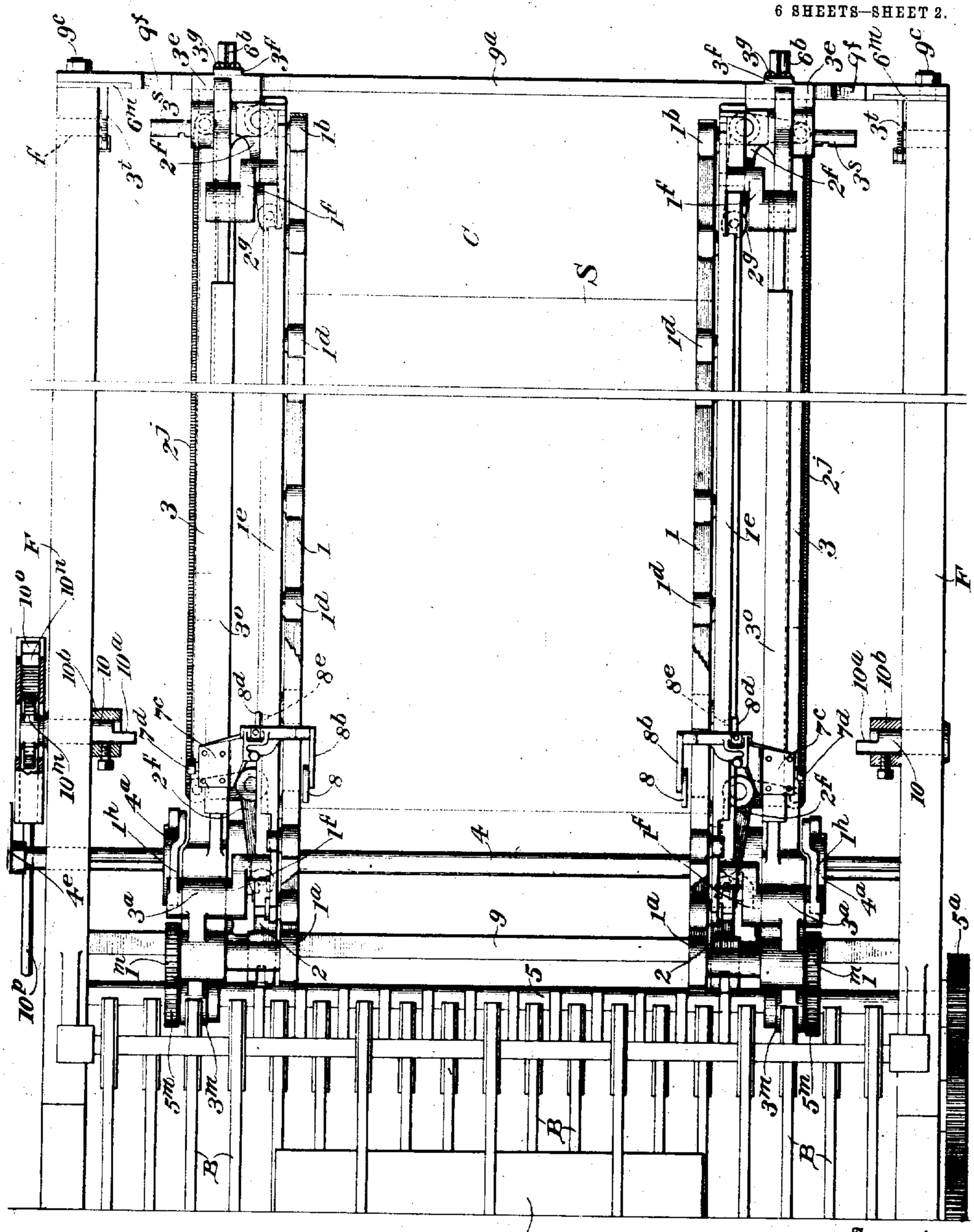

Fig. 2.

Witnesses

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6 SHEETS—SHEET 3.

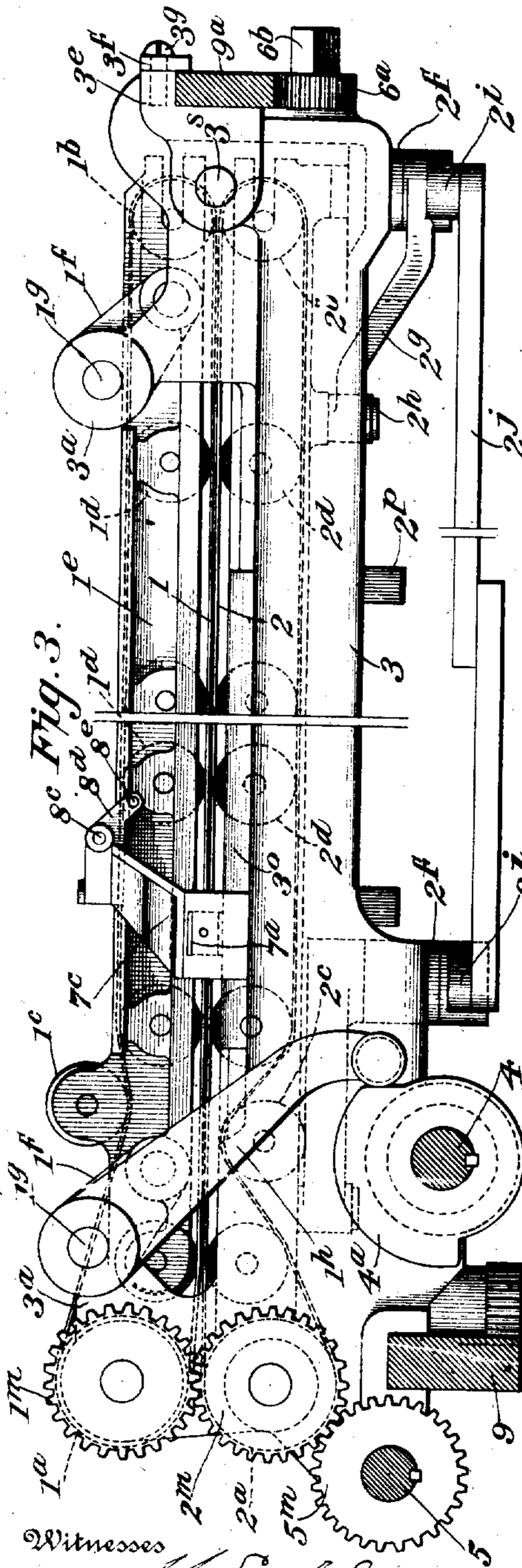

Fig. 3.

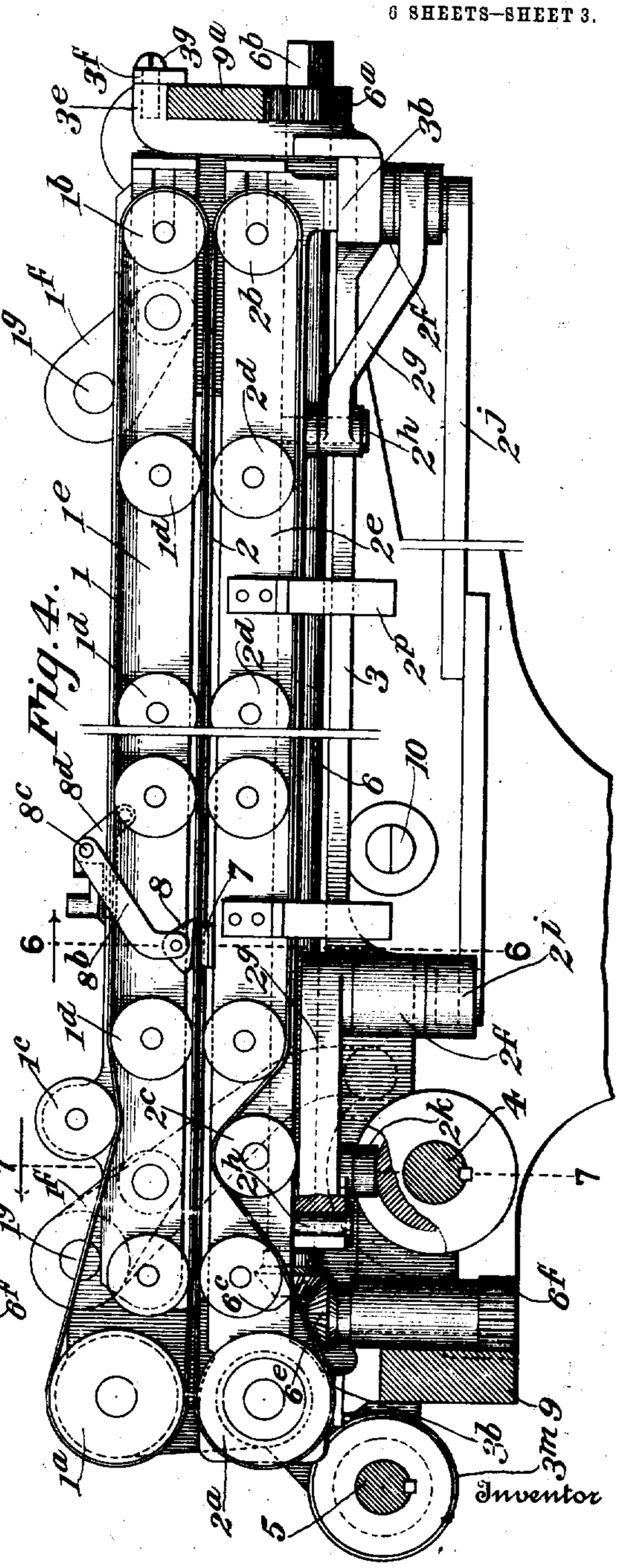

Fig. 4.

Witnesses

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6 SHEETS—SHEET 4.

Fig. 5.

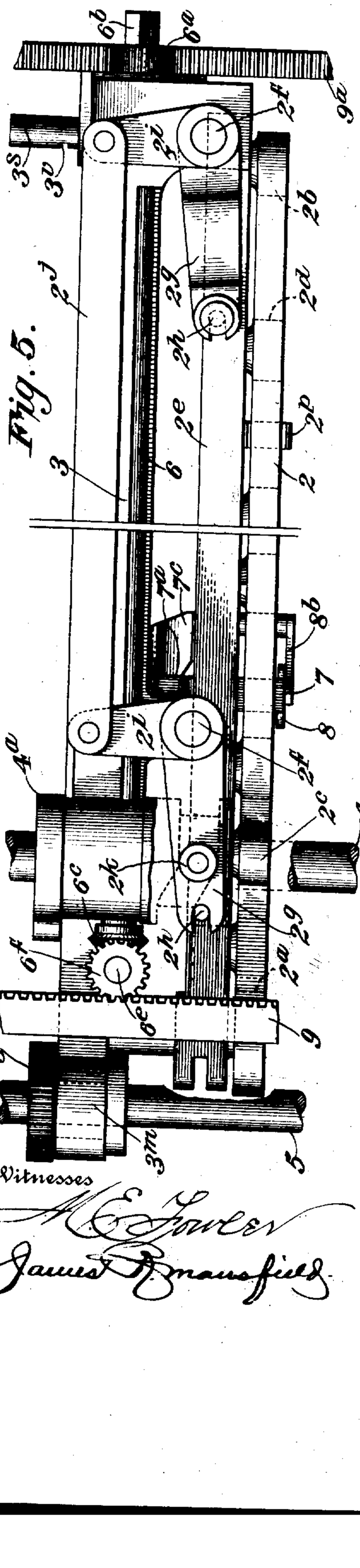


Fig. 8.

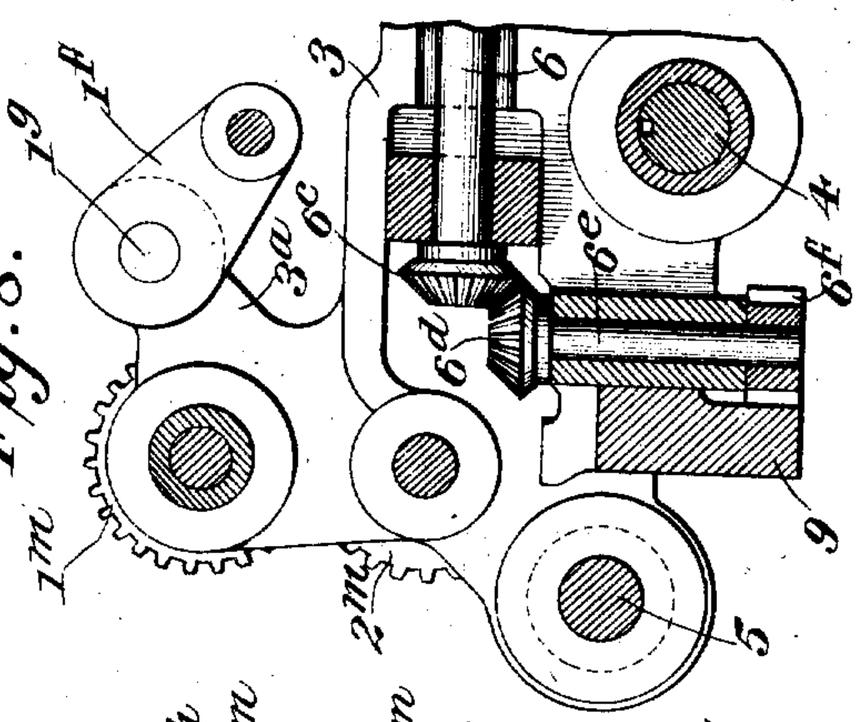


Fig. 7.

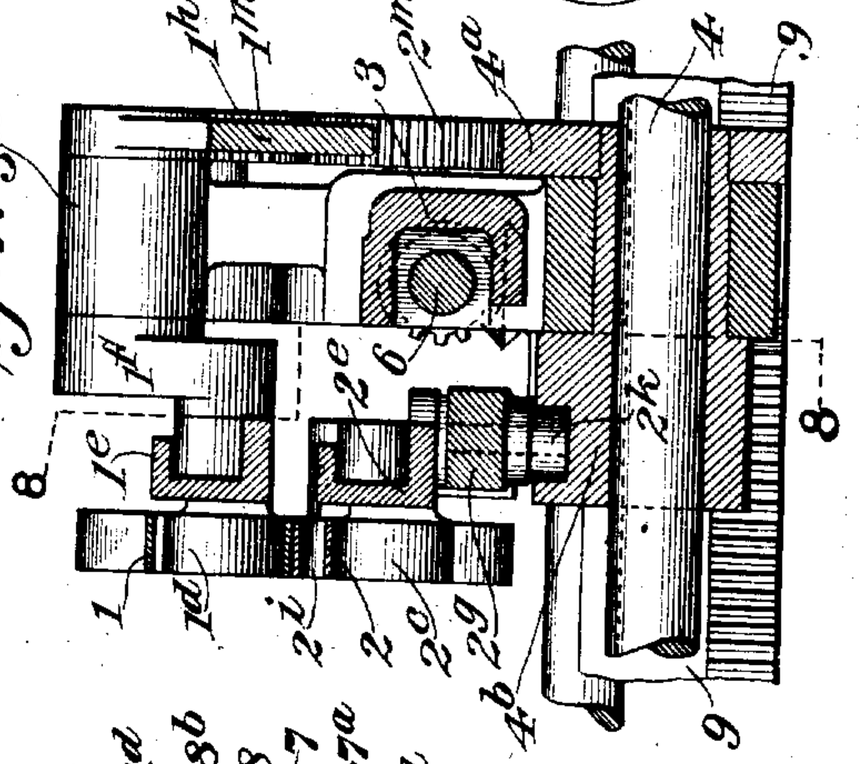
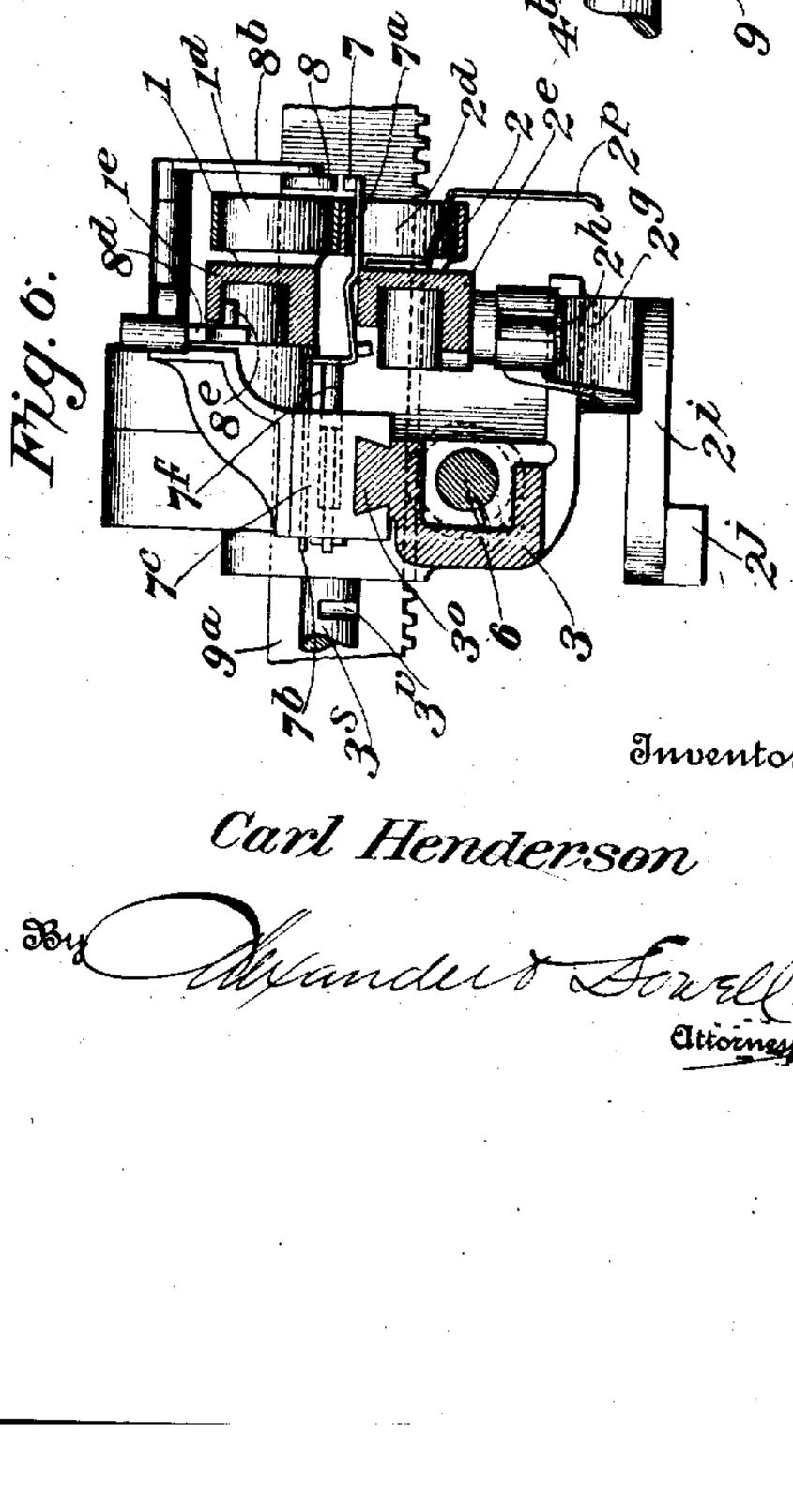


Fig. 6.



Witnesses

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6 SHEETS—SHEET 5.

Fig. 12.

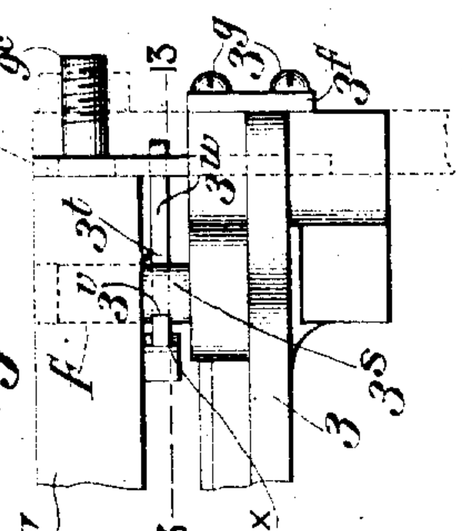

Fig. 13.

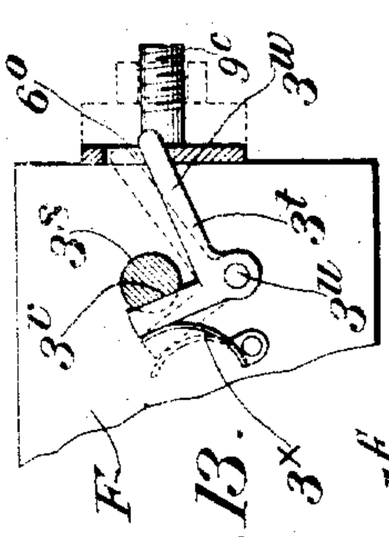

Fig. 10.

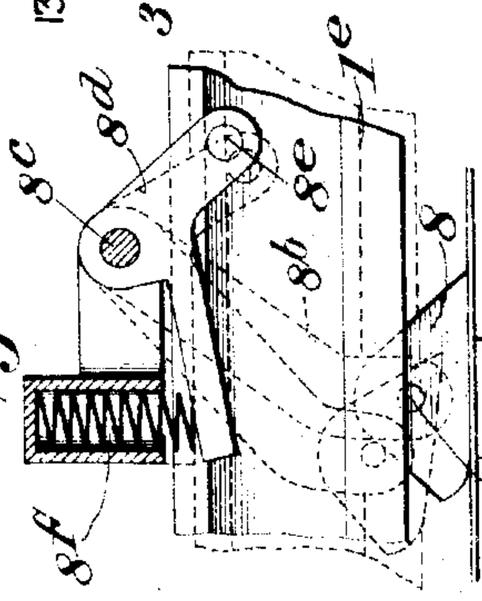

Fig. 11.

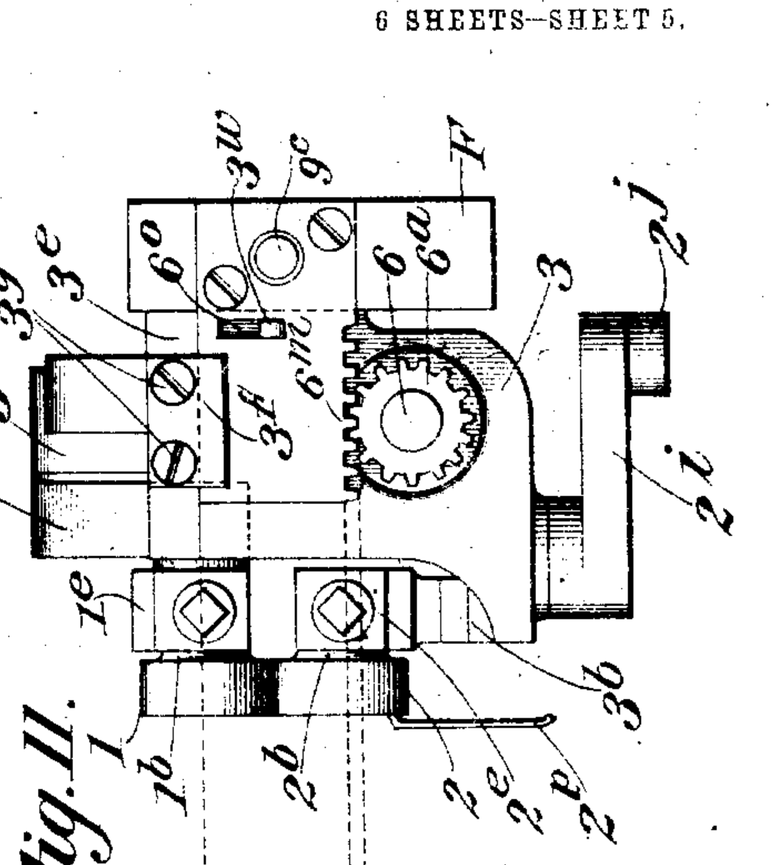

Fig. 9.

Witnesses

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APPLICATION FILED MAR. 18, 1910.

974,062. Patented Oct. 25, 1910.

6 SHEETS—SHEET 6.

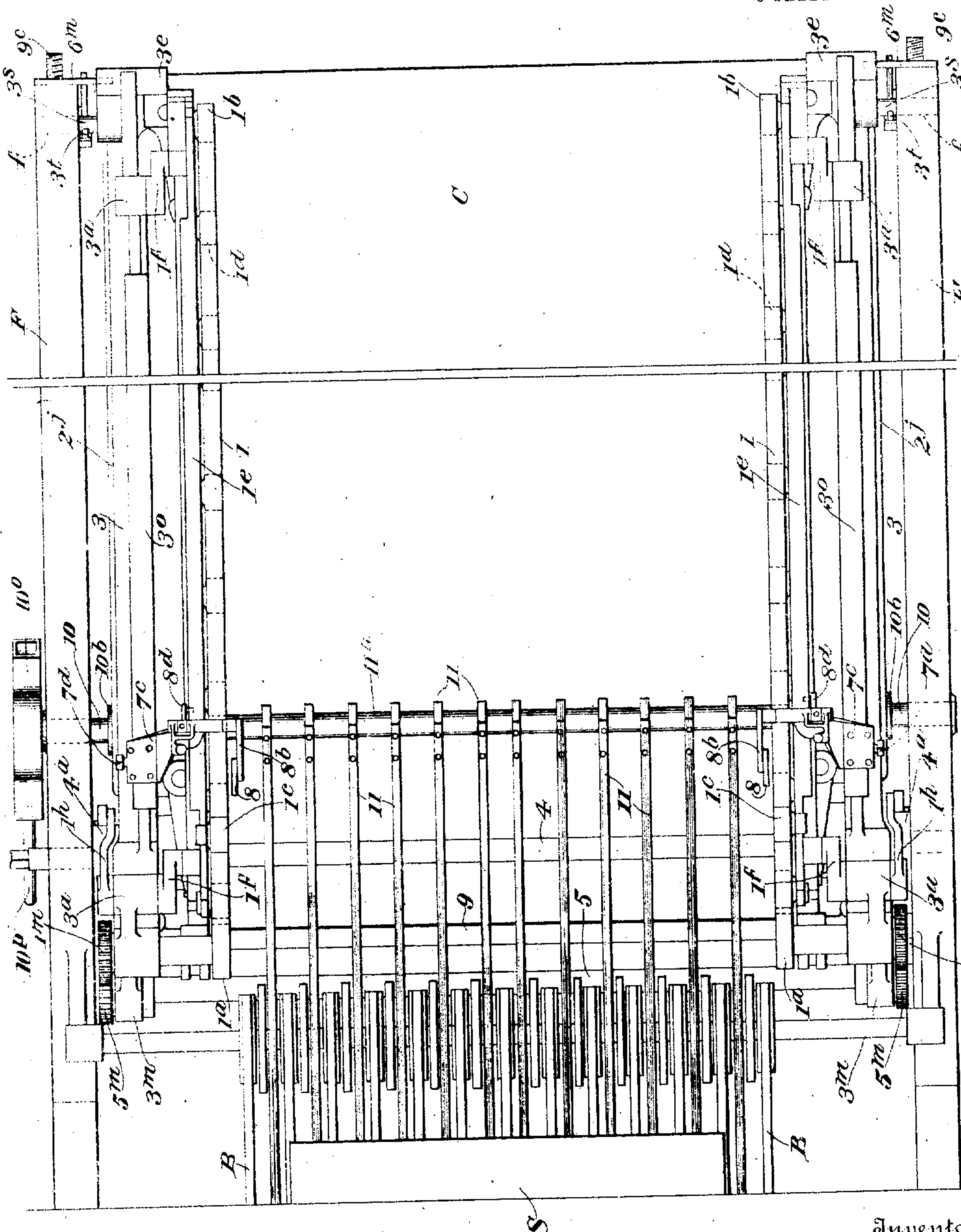

Fig. 15.

Witnesses:

[signature]

James [signature]

Inventor:

Carl Henderson

By [signature]

Attorneys

UNITED STATES PATENT OFFICE.

CARL HENDERSON, OF OAK PARK, ILLINOIS, ASSIGNOR TO MIEHLE PRINTING PRESS AND MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

SHEET-DELIVERY MECHANISM FOR PRINTING-PRESSES.

974,062. Specification of Letters Patent. **Patented Oct. 25, 1910.**

Application filed March 18, 1910. Serial No. 550,230.

To all whom it may concern:

Be it known that I, CARL HENDERSON, of Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sheet-Delivery Mechanism for Printing-Presses; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is a novel improvement in sheet delivery mechanism for printing presses especially designed for use in connection with high speed printing machinery, and its object is to provide a mechanism which will handle sheets at high speed without smutting or smearing same, and can deliver them printed side up; and can be readily adjusted to handle sheets of any width up to the maximum. Also to provide a mechanism which can, if desired, be readily adjusted out of the way so as to enable sheets to be delivered printed side down by means of a fly; it being desirable, in general printing offices, at times to have sheets delivered from the press printed side up, and at other times delivered printed side down.

The delivery apparatus forming the subject-matter of this invention essentially embodies pairs of endless carriers, preferably tapes, adapted to engage the outer margins of the sheets and carry same to the point of delivery, then the tapes are slightly separated to release the sheet, and the lowermost tapes are withdrawn out of the way; and means are provided for arresting the sheet substantially simultaneously with its release so that the released sheet can drop by gravity upon the receiving table at the point of delivery. In connection with the endless carriers, series of clamping rollers are employed which cause the parallel runs of the tapes, when in sheet taking position, to positively bite the margins of the sheets and hold them securely while carrying them to the point of deposit.

The present invention has reference to the novel mechanical features of construction of such a delivery mechanism; such as the means for separating the tapes to release the sheet; the means for arresting the sheet; the means for withdrawing the lower sets of carriers from beneath the sheet; the means for adjusting the opposite sets of carriers toward or away from each other to suit different widths of sheets; and the means for changing to a fly delivery; all of which, and other novel details of construction and combinations of parts, will be described in detail with reference to the accompanying drawings, in which the same are illustrated, and which form part of the present specification.

The invention in particular is an improvement upon the delivery apparatus shown in my application for patent filed May 13, 1909, Serial Number 495,599.

In said drawings—Figure 1 is a diagrammatic side elevation of a printing press equipped with my invention. Fig. 2 is an enlarged plan view of a portion of such a press with my delivery apparatus applied thereto. Fig. 3 is an outside elevation of the right-hand carrier, partly broken away. Fig. 4 is an inside elevation of the left-hand carrier, partly broken away. Fig. 5 is a bottom plan view of one of the carriers. Fig. 6 is a transverse sectional view of the carrier on line 6—6, Fig. 4. Fig. 7 is a similar view on line 7—7, Fig. 4. Fig. 8 is a detail sectional view on line 8—8, Fig. 7. Fig. 9 is an enlarged sectional view of a carrier showing the parts in sheet delivering position. Fig. 10 is a detail sectional view on line 10—10, Fig. 9. Fig. 11 is an end view of the carrier showing it at the limit of its outward movement with end supporting bar removed. Fig. 12 is a detail plan view of the carrier locking device; and Fig. 13 is a detail sectional view on line 13—13, Fig. 12. Fig. 14 is an enlarged detail view on line 14—14 Fig. 1, showing the manner of applying the fly shaft. Fig. 15 is a plan view showing the fly in position.

In Fig. 1, A represents the cylinder of a sheet printing press, such as the well known "Miehle" press; B represents endless tapes which are employed in such printing presses to receive the printed sheets from the cylinder; and C is the table upon which the sheets are ultimately delivered.

My delivery apparatus is adapted to receive sheets from the tapes B, and carry them to and over the table C, and deposit them thereon; but while I shall describe the invention in connection with such a press, it should be understood that it is applicable to many other styles of machines, and could

be arranged to receive sheets directly or indirectly from the cylinder A, as will be readily understood by those familiar with the art. In applying my invention to such a press I arrange at opposite ends of and above the table C, two bars 9, 9^a, which are secured to the ordinary frame-work of the machine and support the adjustable sets of sheet carriers. Two sets of such carriers are employed; they are constructed alike, except that they are opposites—(or for right and left sides)—and the description of one will explain both, similar parts being similarly lettered in the drawings.

Slidably mounted upon and between the bars 9, 9^a, is a sliding frame or casting 3 upon which the operative parts of one set of sheet carriers are supported. The casting 3 is shaped substantially as shown in the drawings, and is provided with apertures in its end adjacent bar 9 for the passage and reception of the several shafts hereinafter referred to. The shape of this casting 3 can be somewhat varied to suit the particular structure of the press or machine to which the invention is applied.

Mounted on the casting 3 is a pair of endless carriers 1 and 2, which are arranged parallel and one over the other, so that the adjacent runs of said carriers, which are preferably endless tapes, are normally close together and in position to receive the edge of a sheet as it leaves the tapes B. The endless carrier 1 runs over pulleys 1^a and 1^b at opposite ends of a bar 1^e, and under an intermediate pulley 1^c mounted on a stud on bar 1^e, by which the carrier is held close to the pulleys 1^d. The bar 1^e is pivotally connected at its ends to crank arms 1^f which are pivoted at 1^g in studs 3^a rising from the casting 3. The rearmost pivot 1^g is extended and connected to a crank arm 1^h, (Figs. 1, 2 and 7) the lower end of which is adapted to contact with a cam 4^a on a transverse shaft 4 (Fig. 3) which is journaled in the side frames of the machine and extends through suitable apertures in the casting 3 adjacent the supporting bar 9. The cranks 1^f incline in the same direction and at the same angle; therefore when the crank 1^h is lifted the bar 1^e and the endless carrier 1 thereon will be raised; but the bar 1^e normally remains, by gravity, in the lowest position permitted by the cam 4^a. Idler rollers 1^d are journaled on studs attached to bar 1^e in position to impinge against the lower run of the carrier 1. The endless carrier 2 normally lies directly beneath the carrier 1, and is mounted upon rollers 2^a and 2^b at opposite ends of a bar 2^e. This bar is normally supported and maintained in exact parallelism with the bar 1^e by having its ends seated upon supporting brackets 3^b at opposite ends of the casting 3, upon which the bar 2^e is slidable laterally so as to permit carrier 2 to be moved from beneath the carrier 1, bar 2^e being shifted laterally by means of bell-crank levers pivoted at 2^f on the casting 3 (Figs. 4 and 5); the long arms 2^g of said levers being slotted to engage pins 2^h on the under side of bar 2^e, and the short arm 2^i of said levers being pivotally connected together by a tie-rod 2^j so that when one of these levers is rocked, the other is rocked correspondingly, and thus bar 2^e, with the carrier 2, can be moved sidewise and horizontally. The bell-crank lever nearest shaft 4 carries on its under side a roller or pin 2^k which engages a race-cam 4^b on shaft 4 (Figs. 4—5 and 7—9); and said cam is so shaped that at the proper time the bar 2^e is moved so as to withdraw carrier 2 from beneath carrier 1, and then return it to position thereunder as hereinafter explained.

On the bar 2^e are mounted a series of idler rollers 2^d adapted to engage the upper run of carrier 2; and said idlers are located opposite the rollers 1^d so that when the carriers 1 and 2 are in sheet holding position (Figs. 3, 4), said rollers cause the adjacent parallel runs of the carriers 1 and 2 to positively bite the edges of the sheet lying therebetween. A roller 2^c may be provided to hold carrier 2 close to the pulleys 2^d as indicated in Figs. 3—4.

The rollers 2^a and 1^a are the driving rollers for the carriers 1 and 2 and on the shafts of said rollers are mounted intermeshing gears 1^m, 2^m, (Fig. 3), gear 2^m meshes with a driving gear 5^m on a transverse shaft 5 journaled in the main frame of the machine and extending through suitable apertures in the casting 3. The gear 5^m is splined on shaft 5 and is slidable thereon but confined to move with the casting 3 by means of a finger 3^m on the casting engaging a groove in the hub of the gear 5^m, (see Figs. 2, 5, 8). Similarly the cams 4^a, 4^b, are splined to and slidably mounted on the shaft 4, cam 4^a being fastened to the hub of cam 4^b (Fig. 7) and can move with the bar 3 longitudinally of the shaft.

The casting 3 is slidably supported upon the bar 9, as indicated in Figs. 3 and 4, and its rear end has a lip 3^e by which it is slidably supported upon the upper edge of the bar 9^a, and preferably it is kept from longitudinally disengaging bar 9^a by means of a plate 3^f detachably fastened to the lip 3^e by screws 3^g (Figs. 4 and 11).

The bar 9^a is toothed on its under side, as shown, and with such teeth meshes a pinion 6^a on a shaft 6 which extends longitudinally of and is suitably journaled in casting 3, and has on its inner end a bevel gear 6^e (Fig. 4) which meshes with a similar bevel gear 6^e on the upper end of a short shaft suitably journaled in the casting 3 and having on its lower end a pinion 6^f, similar to pinion 6^a; and said pinion 6^f meshes with gear

teeth cut in the side of bar 9 as shown in Figs. 4—8. The shaft 6 may be turned by any suitable means, (as by a wrench or crank applied to the squared outer end 6^b thereof), and when shaft 6 is turned pinions 6^a, $6'$, are simultaneously rotated, and meshing with the fixed racks will move the casting 3 transversely of the press. In this manner each casting 3 and the set of carriers connected therewith, can be adjusted laterally and transversely of the table C.

Both the right and left sets of carriers are constructed alike, and consequently said carriers are independently adjustable to or from each other, and therefore can be set to take any width of sheet printed on the press or forwarded by the tapes B, from the smallest to the largest, and are always set to take the sheet by its extreme outer margins as indicated in Figs. 2 and 9.

Motion may be imparted to the shaft 5 in any suitable manner, but preferably by means of a train of gears, indicated at 5^a, from the drive shaft of the press, or other suitable driven shaft thereof; by which the shaft 5 can be operated at such speed as to cause the endless carriers 1 and 2 to move lineally at the desired speed, which should be that of the travel of the sheet at the moment it is delivered from the cylinder or tapes B to the carriers 1 and 2.

The cam shaft 4 may be most conveniently operated by means of a crank arm 4^e on one end, which crank can be operated from any suitable part of the press. As applied to a "Miehle" press I operate the shaft 5 by the same crank 14 and connecting rod 4^o which is ordinarily employed in such presses to travel the gripper delivery;—and when the delivery apparatus is applied to such presses it is not necessary to provide any new cam mechanism for operating the shaft 4. The cams 4^a, 4^b, are so set on shaft 4 that they will shift the bars 1^e, 2^e, at the proper times as hereinafter explained.

In operation the castings 3 are adjusted so that as a sheet S issues from the tapes B its outside margins will be entered between and seized by the pairs of opposing endless carriers 1 and 2, as indicated in Figs. 2, 4. The rollers 2^d, 1^d, cause these carriers to securely bite the edges of the sheet and forward same over the table C. When the sheet has reached the point where it is desired to drop it upon the table C, the shaft 4 is rocked so as to shift cams 4^a, 4^b, in such manner that cam 4^a first rocks arms 1^h, and thereby causes bars 1^e to slightly rise separating carriers 1 a little from the carriers 2, and thus releasing the sheet. Just as the sheet is released means are provided as hereinafter explained to arrest the sheet so that it will not travel farther by momentum when released from the tapes. Simultaneously with the arresting of the sheet the cam 4^b operates bell-crank levers 2^g and causes bars 2^e to move outward and withdraw the carriers 2 from beneath the margins of the sheet (Fig. 9), permitting the latter to drop freely onto the underlying table C. After the sheet has dropped and before another sheet has advanced to the carriers 1 and 2,—cam 4^b shifts bars 2^e back to normal position returning carriers 2 beneath carriers 1, and then cam 4^a permits bars 1^e to lower and bring carriers 1 again into contact with carriers 2 ready to receive a new sheet. The carriers 1 and 2 however can run continually during the delivery of the sheets.

Sheet arresting devices.—The sheet arresting devices above referred to preferably comprise upper and lower members adapted to engage the margins of the sheet, preferably near the tail end thereof, just as the carriers are separated to release the sheet. Each sheet arresting device comprises a lower member 7 (Figs. 3, 4, 6, and 9) mounted upon the end of a spring arm 7^a which extends across the bar 2^e and underneath the upper run of the carrier 2 so as to bring the member 7 close to the inner edge of the upper run of said carrier 2. The spring arm 7^a rests upon the top of bar 2^e and is connected to a slide 7^b guided in a bracket 7^c, which bracket is adjustably attached to the casting 3. Preferably bracket 7^c has a dove-tailed groove on its under side engaging a similarly shaped rib 3^o on the upper side of casting 3 (Fig. 9) and the bracket can be fastened when adjusted on the carrier by means of a set screw 7^d (Fig. 2). The slide 7^b is normally held in its innermost position (Fig. 6) by means of a spring 7^e placed in a pocket in the bracket 7^c and engaging a shouldered pin 7^f attached to the slide 7^b; see Figs. 6 and 9. The spring arm 7^a has a slight bend in it, indicated at 7^g (Fig. 9) which normally rests upon the upper side of the bar 2^e, when said bar is in normal position beneath bar 1^e (Fig. 6); and then the part 7^a is held in uppermost position by reason of bend 7^g resting upon the upper edge of bar 2^e. But when bar 2^e is retracted it first moves from beneath the bend 7^g and allows the spring arm 7^a to slightly drop; (Fig. 9) thus releasing the sheet; and as bar 2^e continues to move outward it engages a lug 7^h on spring arm 7^a (Fig. 9) and forces said arm and slide 7^b outward against the action of spring 7^e, and thus withdraws clamp-member 7 out of the way of the dropping sheet.

The upper clamp-member 8 is preferably in the form of a pivoted plate (Figs. 9 and 10) slightly curved on its under side and pivoted at 8^a to the lower end of an arm 8^b attached to a rock-shaft 8^c journaled in an extension of the bracket 7^c; and on this shaft 8^c is a crank-arm 8^d which depends be-

side the bar 1^e and has a finger 8^e on its lower end underlying the upper flanged edge of bar 1^e (Figs. 9 and 10) and normally engaged therewith. The construction is such that when the bar 1^e is in its lowermost position it depresses arm 8^e so as to raise arm 8^b and separate clamp-member 8 from clamp-member 7 (Fig. 10) so that the sheet arresting clamps are normally open and will not interfere with the free movement of the sheet by the carriers 1 and 2. When however bars 1^e rise fingers 8^e are released and the clamps are immediately closed upon the sheet by the action of springs 8^t (Fig. 10) which are arranged to cause the shafts 8^c to rock when permitted by finger 8^e, and depress arms 8^b and raise arms 8^e, which arms are set at opposite angles on the shaft (Fig. 10) so that when one is depressed the other is raised. As soon as a sheet has been forwarded by the carriers 1 and 2 to the point of delivery, bars 1^e begin to raise and separate the carriers, but arms 8^b immediately lower and the clamp-members 8 press the edges of the sheet against the clamp-members 7; and owing to the shape of the clamp-members 8 the sheet is not clamped so instantaneously as might cause it to rupture, but the sheet is arrested in a comparatively gentle manner but so positively that it will be dropped at the desired point. After the sheet is arrested bars 2^e move outward until they pass beneath bends 7^g in the spring arms 7^a the latter drop (Fig. 9) so as to further move clamp-members 7 away from the members 8, and upon the continued further outward movement of bars 2^e the clamp-members 7 are withdrawn from beneath the margins of the sheet (Fig. 9) sufficient to prevent the sheet hanging or pitching sidewise on the clamp-members 7. After the sheet has been dropped bars 2^e are moved inward and clamp-members 7 are returned to normal position (Fig. 6) and when bars 1^e are lowered to bring the carriers 1 and 2 into contact the arms 8^b are rocked upwardly and keep the clamps open, so that the incoming sheet will not be affected or impeded by the clamps. These sheet arresting devices can be adjusted to any position desired lengthwise of the castings 3, so as to operate on long or short sheets and at any point of their length; but it is preferable in practice to have the clamps engage the sheet near the tail end thereof. Depending guard fingers 2^p may be attached to the inner sides of bars 2^e, between the rollers 2^d, to prevent the sheets accidentally catching upon the lower runs of the tapes B, or slipping sidewise under the bars.

The fly delivery.—It is sometimes preferable to have the sheets delivered printed side down, instead of printed side up, and therefore it is desirable to have the press capable of delivering sheets in either way. As shown in Fig. 15 the castings 3 with their sets of endless carriers, can be put out of active operation and the sheets be delivered printed side down by a fly.

In order to enable the fly delivery to be used on a press equipped with my delivery, the castings 3, with their sets of endless carriers, are shifted, to their extreme outermost positions, against the side frames F of the machine, (see Fig. 15). The castings 3 are provided on their rear ends and outer sides with pins 3^s (Figs. 2, 12, 13), which pins are adapted to enter holes *f* in the side frames F when the castings 3 are moved to their outermost positions. Then bar 9^a is removed (see Fig. 15). When the castings are in their outermost positions the pinions 6^a engage short rack-plates 6^m attached to the ends of the side frames F (Fig. 11); the teeth of plates 6^m register with the teeth on bar 9^a, and plates 6^m keep the pinions 6^a in proper meshing position while bar 9^a is removed, (see Figs. 11 and 15).

The castings 3 can be locked in their outermost positions when bar 9^a is removed, by means of latches 3^t pivoted at 3^u on the frames F (Figs. 2, 12, 13); the inner ends of said latches being adapted to engage notches 3^v in the pins 3^s when the castings 3 are adjusted to their outermost positions and bar 9^a removed, and thus lock the castings in their outermost positions. The catches 3^t have rearwardly projecting fingers 3^w which are adapted to project through holes 6^o in the plates 6^m, when the bar 9^a is removed; but when the bar 9^a is in place the catches 3^t will be held out of position to engage pins 3^s and will not interfere with the lateral adjustment of the carriers 3. The catches 3^t may be thrown into engagement with the pins 3^s, when permitted, by means of suitable springs—such for example as indicated at 3^x in the drawings; but the catches 6^n are normally held out of engagement with pins 3^s by the bar 9^a, when the latter is in place. When the carriers 3 are adjusted to their outermost positions, as in Fig. 15, the plates 3^f register with notches 9^f in the upper edge of bar 9^a, (Fig. 2) and the bar 9^a can then be readily removed from the machine by loosening the fastening nuts on the screw studs 9^c which support said bar upon the ends of the frames F. When the castings 3 are in the position shown in Fig. 15 the sets of sheet carriers 1 and 2 are entirely out of the way of the sheets and there is nothing to obstruct the operation of a fly delivery. In the opposite side frames F, at points beneath the castings 3 and slightly in rear of the shaft 4, are journaled stub shafts 10 (Figs. 1, 14, 15) the inner ends of which are shouldered as shown at 10^a (Fig. 14); and on the inner ends of these stub shafts are placed sliding collars 10^b which can be

fixed in adjusted positions by means of tap-bolts, or other suitable locking devices. To stub shaft 10, at the side adjacent crank 4ᵉ, may be attached a segment gear 10ᵐ which meshes with a rack-bar 10ⁿ slidable in a rocking guide 10ᵒ and connected by a rod 10ᵖ to a rocking lever 10ᵍ pivoted beside a cam 4ⁿ, which may be on the shaft carrying crank 14, as in the "Miehle" press. The shaft 4 is preferably put out of operation when the fly-delivery is used by detaching rod 4ᵉ from crank 4ᵉ.

An ordinary fly-frame composed of fingers 11 attached to a shaft 11ᵃ may be used; the ends of shaft 11ᵃ are shouldered as at 11ᵇ, correspondingly to the ends 10ᵃ of the stub shaft 10; and the shaft 11ᵃ can thus be removably fitted onto and between said stub shaft 10 (Figs. 14 and 15) and secured thereto by the sleeves 10ᵇ. When the fly-frame is properly adjusted and the rod 4ᵉ disconnected from the crank 4ᵉ the fly-frame will be operated to take sheets from the tapes B and deliver them face downward upon the table C, just like an ordinary printing press fly-delivery. When it is desired to again deliver the sheets printed side up, the fly-frame 11ᵃ is removed from the stub shaft 10; and rod 4ᵉ reconnected to the crank 4ᵉ on shaft 4; the rack-bar 9ᵃ is replaced; and the castings 3 moved inward to bring their endless carriers into position to properly receive the sheets; whereupon the sheets will be delivered face uppermost, in the manner before described.

What I claim is:

1. In sheet delivery mechanism the combination of side frames, parallel transverse bars supported on said frames and provided with racks, a pair of laterally adjustable sheet carrier supports mounted on said bars, pinions on said supports meshing with the racks, means for operating the pinions to adjust the supports on the bars, sheet carriers on each support, and means for operating the carriers.

2. In sheet delivery mechanism for printing presses, a pair of laterally adjustable castings, transverse bars supporting said castings, pinions rotatably mounted on the castings and engaging teeth on said bars to adjust the castings laterally, upper and lower endless sheet carriers mounted on said castings, and means for driving said carriers in any operative positions of the castings.

3. In sheet delivery mechanism, the combination of opposite adjustable supports, transverse toothed bars, pinions rotatably mounted on the supports and engaging teeth on said bars to adjust the supports laterally, a pair of parallel sheet carriers mounted on each support and adapted to engage the margins of a sheet, means for causing the carriers to release the sheet, means for retracting the lower carriers from beneath the edges of the sheet after it is released, and means for driving the carriers.

4. In sheet delivery mechanism for printing presses, the combination of opposite adjustable castings, transverse bars supporting said castings, pinions rotatably mounted on the castings and engaging teeth on said bars to adjust the castings laterally, a pair of parallel sheet carriers mounted on each casting and adapted to engage the margins of a sheet, means for raising the upper carriers to release the sheet, means for retracting the lower carriers from beneath the edges of the sheet after it is released, and means for driving the carriers.

5. In sheet delivery mechanism for printing presses, the combination of a laterally adjustable casting, a vertically movable bar on said casting, a sheet carrier mounted on said bar, and a parallel sheet carrier mounted on the casting beneath the first carrier and adapted to co-act therewith.

6. In sheet delivery mechanism for printing presses, the combination of laterally adjustable castings, a vertically movable bar on each casting, an endless carrier mounted on said bar, and a parallel endless carrier mounted on the casting beneath the first carrier.

7. In a sheet delivery mechanism, the combination of a movable support, a vertically movable bar mounted upon said support, a horizontally movable bar mounted upon said support and normally parallel with the first bar, a sheet carrier mounted upon the vertically movable bar, a co-acting sheet carrier mounted upon the horizontally movable bar, and means for shifting said bars to cause the carriers to release and drop the sheet.

8. In a sheet delivery mechanism, the combination of a laterally adjustable casting, a vertically movable bar on said casting, a sheet carrier mounted on said bar, and a parallel sheet carrier mounted on the casting beneath the first carrier; with means to cause the carriers to release the sheet, and means for stopping the sheet when released by the carriers.

9. In a sheet delivery mechanism, the combination of a support, a vertically movable bar mounted upon said support, a horizontally movable bar mounted upon said support and normally parallel with the first bar, a sheet carrier mounted upon the vertically movable bar, and a co-acting sheet carrier mounted upon the horizontally movable bar, means for moving said bars to cause the carriers to release and drop the sheet, and means for stopping the sheet when released by the carriers.

10. In a sheet delivery mechanism, the combination of a laterally movable support, a vertically movable bar mounted upon said support, a horizontally movable bar mount-

ed upon said support, normally parallel with the first bar, and a pair of sheet carriers, one member of the pair being mounted upon the vertically movable bar and the other member of the pair upon the horizontally movable bar, and means for moving said bars to cause the carriers to release and drop the sheet.

11. In sheet delivery mechanism, the combination of an adjustable support, a horizontally movable bar mounted on said support, cams and levers for reciprocating said bar, a sheet carrier mounted on said bar and adapted to support the edge of a sheet when the bar is in normal position and to free the sheet when the bar is retracted; and a carrier mounted on the support above the first carrier and adapted to coöperate therewith when the first carrier is in normal position.

12. In sheet delivery mechanism, the combination of a laterally adjustable casting, a horizontally movable bar mounted on said casting, cams and levers for reciprocating said bar, an endless sheet carrier mounted on said bar and adapted to support the edge of a sheet when the bar is in normal position and to free the sheet when the bar is retracted, and a second endless carrier mounted on the casting support above the first carrier and adapted to coöperate therewith when the first carrier is in normal position; with means for causing the carriers to release the sheet, and means for stopping the sheet when released by the carriers.

13. In sheet delivery mechanism, the combination with sheet carriers of a sheet stopping device comprising a lower clamp-member adapted to underlie the margins of the sheet, means for normally holding the lower clamp-member in raised position, an upper clamp-member, means whereby the upper clamp-member is normally held out of clamping position but permitted to engage the sheet when the carriers release the sheet, and means for dropping the lower clamp-member and retracting it from beneath the edges of the sheet to permit the latter to drop.

14. In a sheet delivery mechanism, the combination of sheet carriers adapted to engage the margins of a sheet, and means for causing the carriers to release the sheet at the proper time; with a sheet stopping device comprising spring supported clamp-members adapted to underlie the margins of the sheet, and upper co-acting clamp-members, means for normally holding the lower clamp-members in raised position, means for holding the upper clamp-members normally out of clamping position but adapted to permit same to engage the sheet when the carriers release the sheet, and means for dropping the lower clamp-members and retracting them from beneath the edges of the sheet to permit the latter to drop.

15. Sheet delivery mechanism comprising upper and lower carriers adapted to engage the outer margins of a sheet, and means for retracting the lower carrier from beneath the margins of the sheet to permit the latter to drop; with a sheet clamp-member mounted upon a sliding spring arm and normally upheld by the lower carrier-support in sheet engaging position and adapted to be retracted from beneath the sheet upon the outward movement of said lower carrier; an upper clamp-member, a spring for normally closing the upper member upon the lower member, and means whereby the said upper clamp-member is normally held out of sheet engaging position by the upper carrier-support, when the carriers are in sheet engaging position.

16. In sheet delivery mechanism for printing presses, the combination of a sheet carrier, with a sheet stopping device comprising an arm, a clamp-member on the inner end of said arm adapted to underlie the edge of the sheet, a rock-shaft, a crank on said shaft, a clamp-member on the lower end of said crank, a second crank on said shaft, means normally engaging said second crank to hold the upper clamp-member out of operative position, and means for throwing the upper clamp-member into engaging position when the sheet is released by the carrier.

17. In a sheet delivery mechanism for printing presses, upper and lower movable bars, and sheet carriers mounted on said bars and adapted to engage the edges of a sheet when the bars are in normal position; with a sheet stopping device comprising an arm normally resting upon the lower bar, a clamp-member on the inner end of said arm adapted to underlie the edge of the sheet when the lower carrier is in sheet engaging position, a rock-shaft above the upper bar, a crank-arm on said shaft, a clamp-member on the lower end of said arm, a second crank-arm on said shaft engaging the upper bar and adapted to be rocked thereby so as to hold the upper clamp-member out of operative position when the upper carrier is in sheet engaging position, and means for throwing the upper clamp-member into engaging position when the carriers release the sheet.

18. In sheet delivery mechanism, a laterally movable support, sheet carrying devices mounted thereon, transverse bars on which said support is mounted the outermost of said bars being removable, and means for upholding the outer end of said support on the side frame of the press when the support is moved to its outermost position and said bar removed.

19. In a sheet delivery mechanism for printing presses, the combination of a laterally movable casting, sheet carrying devices mounted thereon, transverse bars sup-

porting said casting on the frame of the press, the outermost of said bars being removable, and means on said casting for supporting its outer end upon the said frame when the casting is moved to its outermost position and said bar removed.

20. In sheet delivery mechanism, a laterally movable casting, sheet carrying devices mounted thereon, transverse bars supporting said casting on the frame, the outermost of said bars being removable, means to support the outer end of the casting on the side frame when the casting is moved to its outermost position and the outer bar removed, and a catch to prevent lateral movement of the casting when said bar is removed.

21. In sheet delivery mechanism for printing presses, the combination of a laterally movable casting, sheet carrying devices mounted thereon, transverse bars supporting said casting on the frame, the outermost of said bars being removable; a pin on said casting adapted to engage the side frame of the press when the casting is moved to its outermost position and support the outer end of the casting on the side frame when the outer bar is removed, and a catch engaging said pin to prevent lateral movement of the casting when said bar is removed.

22. In sheet delivery mechanism, a laterally movable casting, sheet carrying devices mounted thereon, transverse bars supporting said casting on the frame, the outermost of said bars being removable, means on said casting for supporting its outer end upon the side frame when the casting is moved to its outermost position and said bar removed; gears on said casting engaging teeth on the bars for moving the casting laterally, and a short toothed plate attached to the frame and engaged by said gear when the bar is removed.

23. In sheet delivery mechanism for printing presses, the combination of sheet carriers adapted to engage the margins of the sheets, a fly delivery, and means for adjusting said carriers out of the way of the sheet to permit the operation of the fly delivery therebetween.

24. In sheet delivery mechanism for printing presses, the combination of laterally adjustable supports, sheet carriers thereon adapted to engage the margins of the sheets, transverse bars carrying said supports, the outer supporting bar being removable, said carriers being adjustable out of the way of the sheets to permit the operation of a fly delivery therebetween.

25. In sheet delivery mechanism, the combination of sheet carriers adapted to engage the margins of the sheets, transverse bars supporting said carriers, said carriers being adjustable on the bars to different widths of sheets, and the outer supporting bar being removable; means for supporting the outer ends of said carriers upon the side frames of the press when the outer bar is removed and the castings adjusted to their extreme outermost positions to permit the operation of a fly delivery therebetween.

26. In a printing press, means for delivering sheets printed side uppermost comprising laterally adjustable sets of carriers adapted to engage the outermost margins of a sheet, means for adjusting said sets of carriers to different widths of sheets or for shifting said carriers to extreme positions against the outer side frames of the press to permit the operation of a fly delivery between the sets of sheet carriers, a fly, and means whereby the carriers may be put out of operation while the fly is operated.

27. In a printing press, means for delivering the sheets printed side uppermost comprising laterally adjustable sets of sheet carriers adapted to engage the outermost margins of a sheet, and fly-actuating means; means for adjusting said sets of carriers to different widths of sheets or for shifting said carriers to extreme positions against the outer side frames of the press to permit the operation of the fly therebetween, said fly being removed from the machine when the carriers are operating to deliver sheets.

28. In sheet delivery mechanism for printing presses, laterally adjustable castings, sheet carriers thereon adapted to engage the margins of the sheets, transverse bars supporting said carriers, the outer bar being removable; means for supporting the outer ends of said castings upon the side frames of the press when said bar is removed, a fly adapted to operate between said carriers when the latter are adjusted to their outermost positions; means for operating either the fly or the timing mechanism of the sheet carriers, the fly being removed when the carriers are adjusted to deliver the sheets.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

CARL HENDERSON.

Witnesses:
HARRY M. HOBBINS,
RALPH M. MARKEL.