F. WESTERBECK.

SHEET FEEDING MECHANISM FOR PRINTING PRESSES.

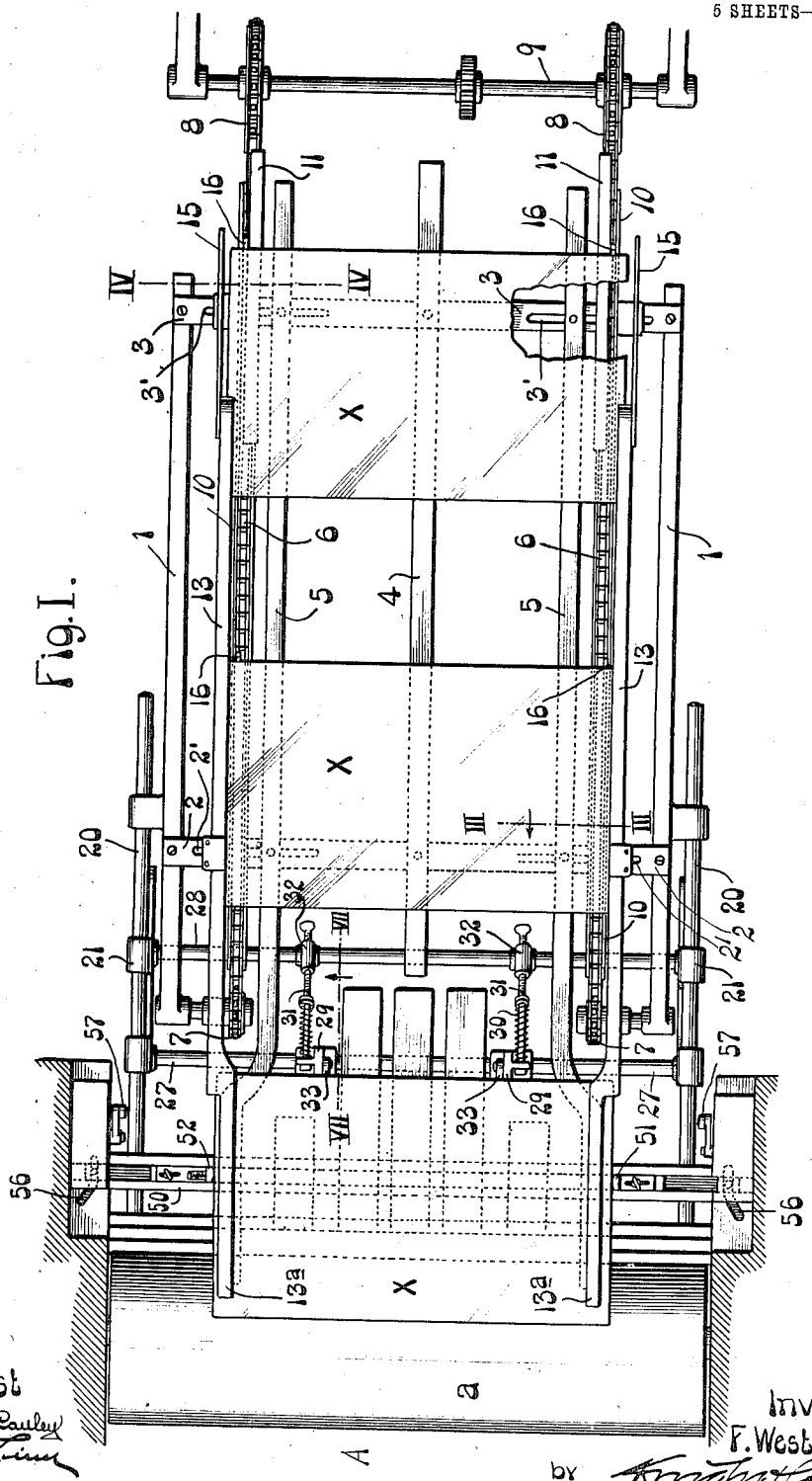
APPLICATION FILED JUNE 5, 1911.

1,029,159.

Patented June 11, 1912.

5 SHEETS—SHEET 1.

Fig. I.



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Inventor:

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5 SHEETS—SHEET 2.

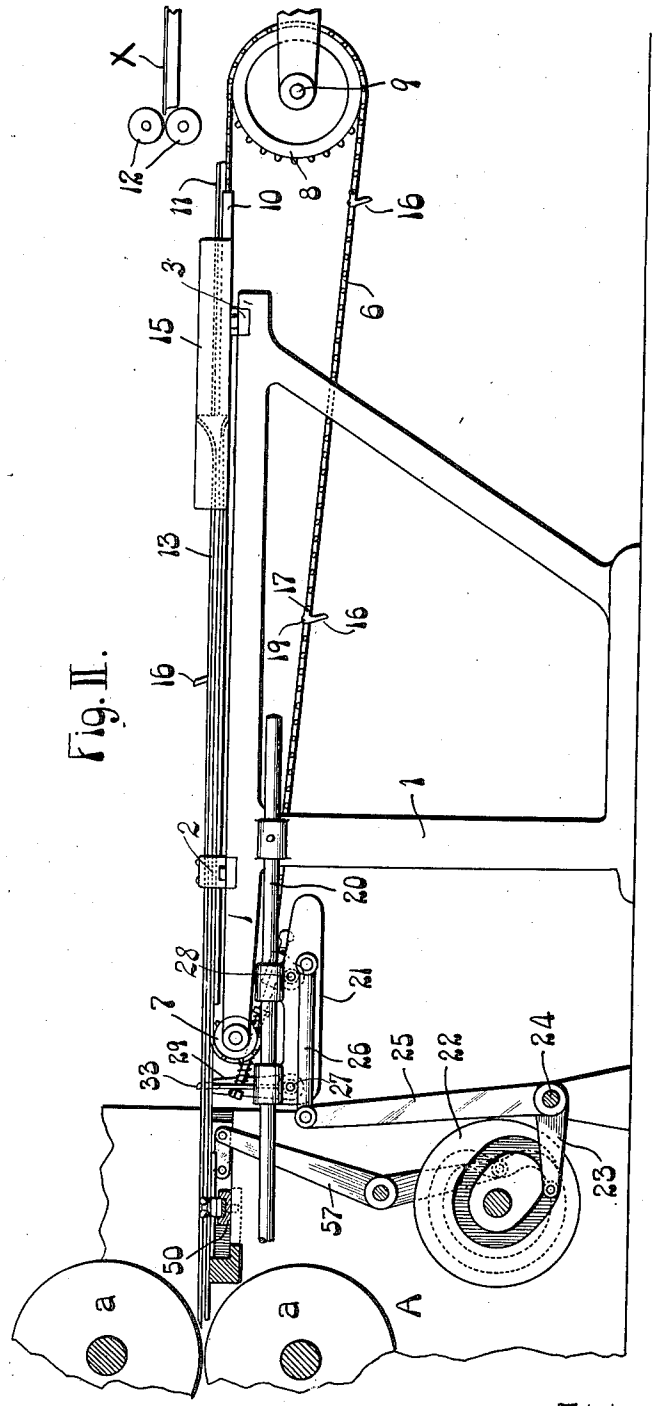

Fig. II.

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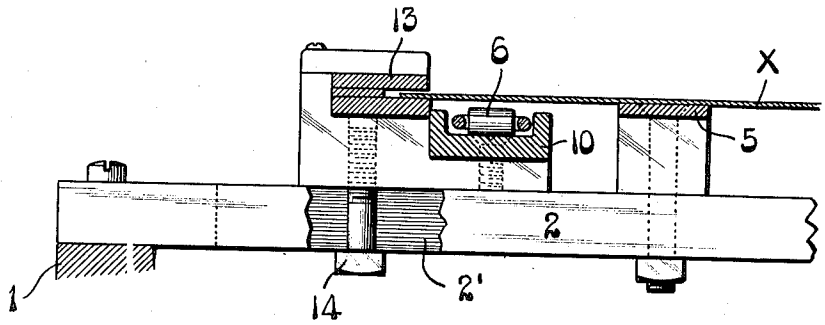
Fig. III.



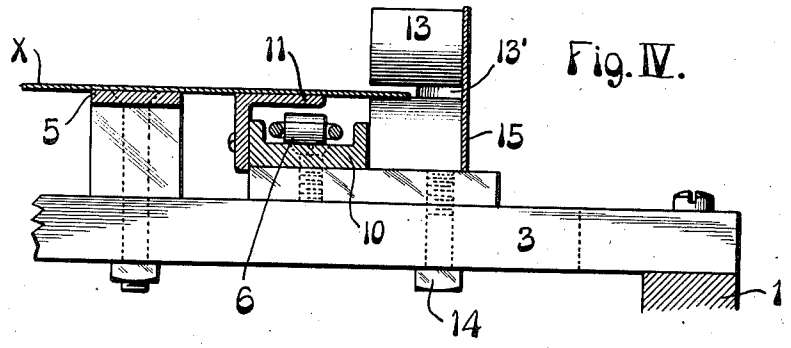


Fig. IV.

Fig. V.

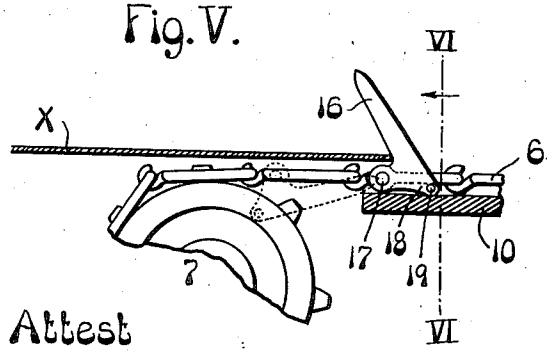
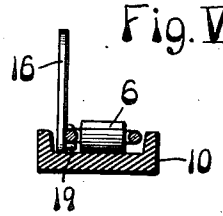


Fig. VI.



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5 SHEETS—SHEET 4.

Fig. VII.

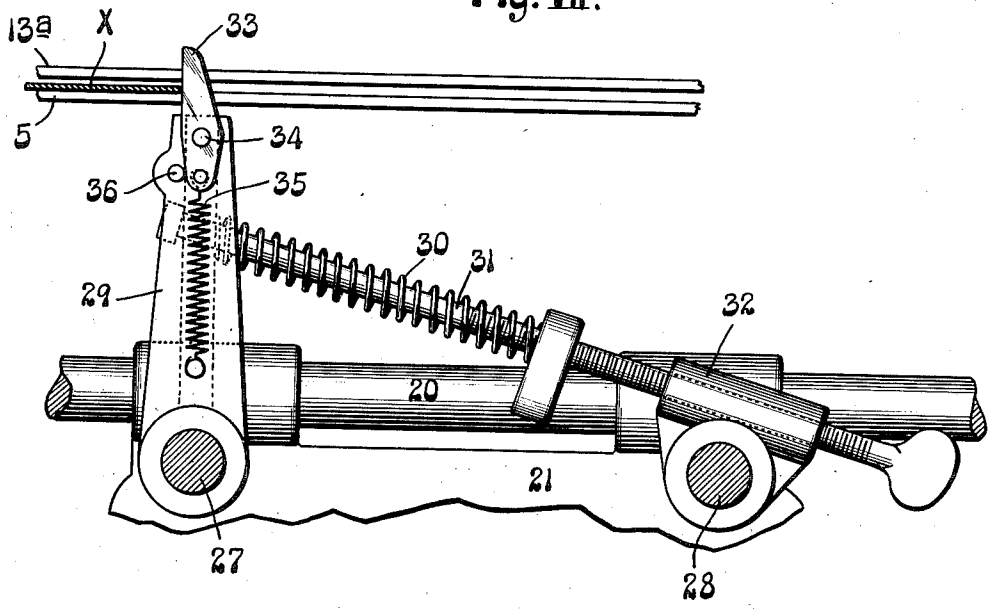
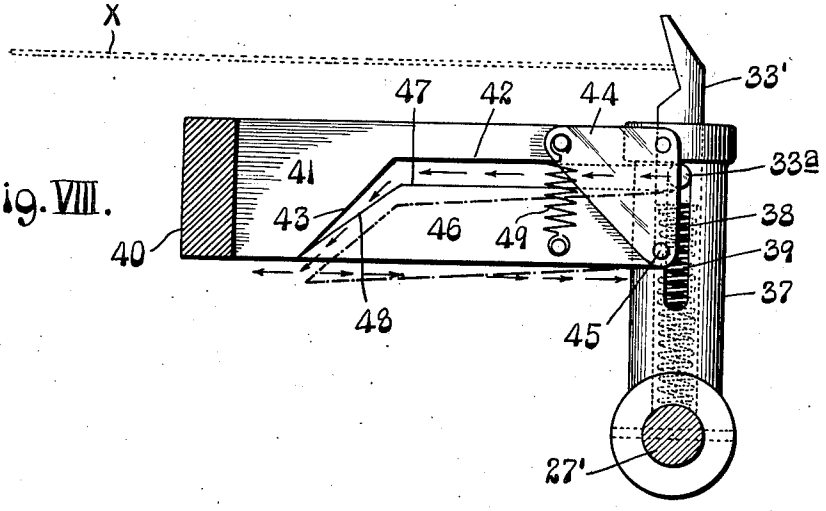


Fig. VIII.



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SHEET FEEDING MECHANISM FOR PRINTING PRESSES.

APPLICATION FILED JUNE 5, 1911.

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5 SHEETS—SHEET 5.

Fig. IX.

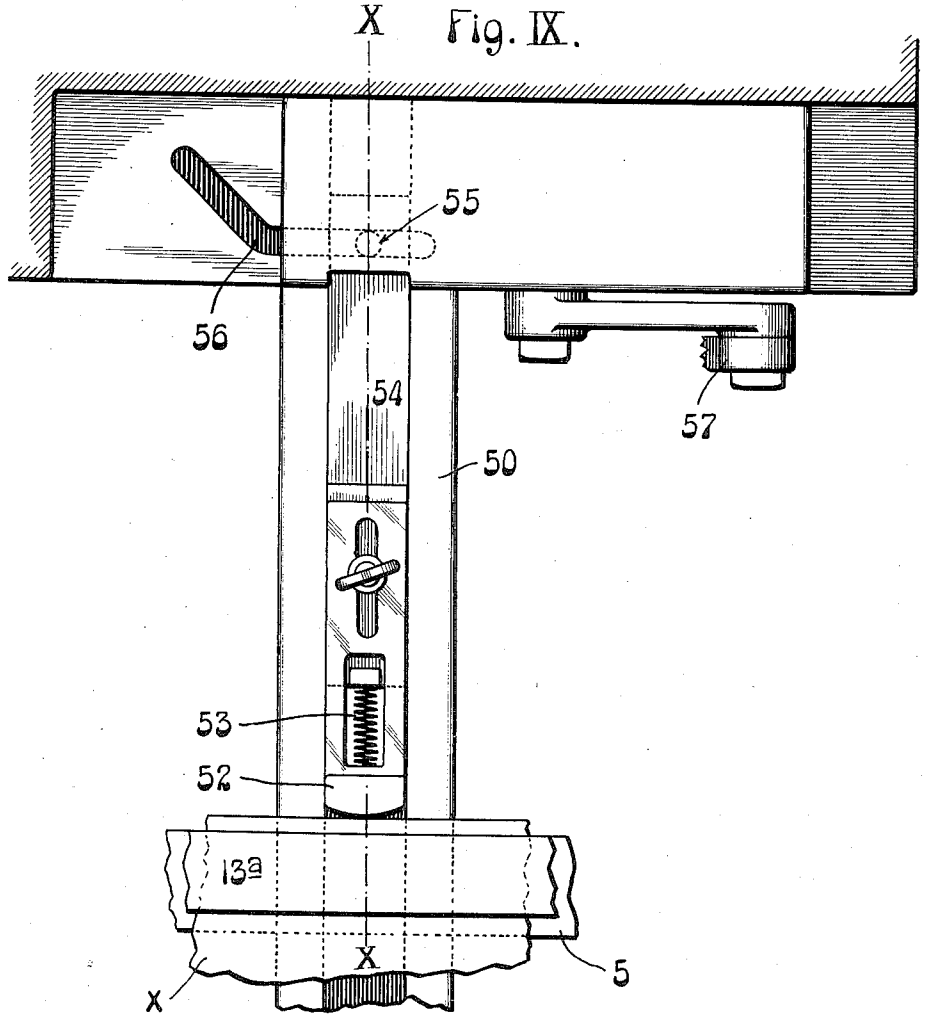
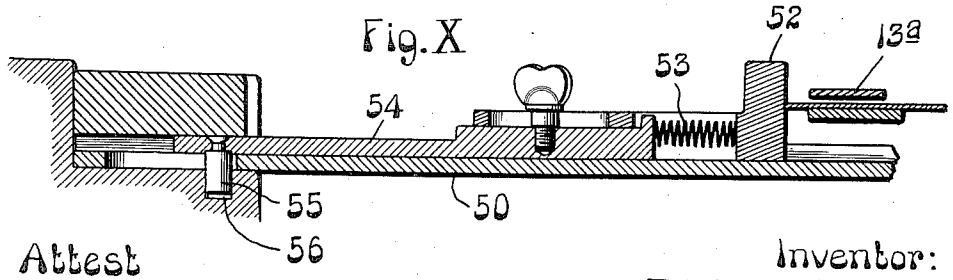


Fig. X



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UNITED STATES PATENT OFFICE.

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SHEET-FEEDING MECHANISM FOR PRINTING-PRESSES.

1,029,159. Specification of Letters Patent. Patented June 11, 1912.

Application filed June 5, 1911. Serial No. 631,291.

To all whom it may concern:

Be it known that I, FREDERICK WESTERBECK, a citizen of the United States of America, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Sheet-Feeding Mechanism for Printing-Presses, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a mechanism for feeding sheets of material to printing presses and it is intended more particularly for feeding sheets of sheet metal to lithographic printing presses. Sheets of sheet metal, owing to the nature of the material upon which printing is to be performed, are peculiarly liable to become distorted when they are being fed to printing presses in the manner heretofore in vogue, with the result of their furnishing imperfect printing surfaces, and with the further result that the sheets not infrequently cause injury to or clogging of the printing press to which they are fed. The distortion of the sheets most frequently occurs due to improper guiding of the sheets and imperfect pressure against the sheets while moving through the feeding mechanism which causes the sheets to be bent or bowed into shapes that will be retained, owing to the absence of inherent tendency in the sheets to return to their normal conditions.

My invention has for its main object the production of a feeding mechanism in which the sheets of material fed thereby are adequately guided during their transit to the printing press to which they are delivered by conveyer chains provided with means that act upon the sheets in such manner as to exert forward pressure against the sheets while they are so supported as to provide for their being operated upon only by the particular elements that serve to protect them and guide them in the feeding mechanism.

A further object of my invention is to so construct the sheet engaging members of the feeding mechanism as to provide for their disengagement from the sheets at a proper and predetermined period of time to avoid injury to the plates.

A further object of the invention is to provide sheet engaging members that are automatically lowered during receding movements of their carriers to pass beneath the sheets being conducted thereover and which are to be subsequently acted upon by the feeding members.

Figure I is a top or plan view of my feeding mechanism. Fig. II is a side elevation of the feeding mechanism. Fig. III is an enlarged vertical cross section taken on line III—III, Fig. I. Fig. IV is an enlarged vertical cross section taken on line IV—IV, Fig. I. Fig. V is an enlarged view, partly in vertical longitudinal section and partly in elevation, illustrating a fragment of one of the conveyer chains and one of the sheet engaging fingers carried thereby, the finger being shown in full lines as it appears when in feeding action against a sheet, and in dotted lines as it appears when it passes beneath the sheet after performing the feeding action. Fig. VI is a cross section taken on line VI—VI, Fig. V. Fig. VII is a vertical longitudinal section taken on line VII—VII Fig. I, with the feeding members adjacent to said line shown in elevation. Fig. VIII is in part an elevation and in part a vertical section of a modified form of feeding device that may be substituted for the feeding device shown in Fig. VII. Fig. IX is an enlarged top or plan view of one of the sheet gaging devices located in my feeding mechanism at its end adjacent to the printing press. Fig. X is a section taken on line X—X, Fig. IX.

In the accompanying drawings: A designates a portion of a printing press, including a pair of feed rollers *a* to which sheets of material, such as sheet metal, may be delivered by my feeding mechanism.

1 designates side frames constituting supports for the movable members of my feeding mechanism.

2 and 3 are transverse supporting bars mounted on the side frames 1 and provided with longitudinal slots 2′ and 3′.

4 is a central longitudinal runner mounted on the transverse bars 2 and 3, and 5 are side runners also mounted on said transverse bars extending to the feed rollers, these runners 4 and 5 being designed to support the sheets X when they are fed through the mechanism so that they will not sag intermediate of their ends, but will be maintained in a perfectly flat condition.

6 designates a pair of endless conveyer chains movable longitudinally of the feeding mechanism. These chains are operable

at the forward end of the mechanism around guide wheels 7 supported by the side frames 1 and at the rear end of the mechanism are operable upon drive wheels 8 fixed to a suitably supported drive shaft 9 that may be operated in any convenient manner. The conveyer chains are arranged beneath the level of the longitudinal runners 4 and 5, (see Figs. III and IV), in order that the sheets X, when placed upon the runners, will not be engaged by the links of the moving conveyer chains to be carried due to frictional engagement between such links and the sheets, but will remain in stationary positions at the rear end of the feeding mechanism, after being placed on the runners until they are engaged by the carrier members of the conveyer chains that will be hereinafter specifically described.

10 are grooved runway bars extending longitudinally of the feeding mechanism and in which the conveyer chains 6 travel in their movement above the supporting frame members, thereby preventing swinging of the conveyer chains while they are performing their office of imparting movement to the sheets fed thereby.

11 are table bars extending longitudinally of the runway bars 10 and jutting thereover and over the conveyer chains to hold the sheets out of contact with the links of the conveyer chains, in order that the links may not impart movement to the sheets by riding in frictional engagement therewith. The table bars 11 are located only at the rear end of the feeding mechanism and are adapted to receive a deposit of the sheets and hold them in readiness to be engaged by the carrier members associated with the conveyer chains 6. It should be here noted that the sheets may be laid by hand upon the table bars 11, or they may be delivered thereto by suitable feed rollers, such as those indicated at 12, (Fig. II).

13 designates channeled guides extending longitudinally of the feeding mechanism adjacent to the sides of the conveyer chains 6. These guides extend forwardly from the table bars 11 and are supported by the transverse bars 2 and 3, preferably in conjunction with the runway bars 10, provision for the transverse adjustment of these members on the supporting bars being made in order that the guides may be moved either inwardly or outwardly transversely of the mechanism to properly receive sheets of varying widths. The means for adjustably holding the guides to the transverse bars comprises set screws 14 that are connected to the guides and are movable in the longitudinal slots 2′ and 3′ in the transverse bars.

Attention should be drawn to the fact that inasmuch as the sheets to be fed are laid upon the table bars 11, it is highly desirable that the guides 13 through which the chains are to be guided in their movement toward the printing press should not be present at the point where the sheets are deposited when delivered to the feeding mechanism, inasmuch as the top members of the guides would interfere with the laying of the sheets upon the table bars. It is, however, important that means be provided for so gaging the position of the sheets when they are deposited on the table bars that they will be properly conducted into the guides; and I therefore provide vertical gage bars 15 that extend rearwardly from the sides of the guides, these gage bars being more widely spaced apart than the inner side guide faces of the guides 13, in order that the sheets may be deposited on the table bars without great care as to their deposit. When the plates are moved forwardly after having been deposited, they are caused to properly enter the guides 13 due to the provision of inclined faces 13′ at the sides of the mouths of the guides, (see Fig. IV).

The endless conveyer chains 6 are equipped with sheet engaging members so designed and so attached to the chains as to provide for the members operating positively against the sheets during feeding action by virtue of the movement of the chains and disengagement of the members from the sheets just previous to the passage of the sheet engaging members around the chain guide wheels 7. The object in providing for the disengagement mentioned is to avoid injury to the sheets at the termination of the feeding action by the chain carried members such as would result if said members moved over and descended beyond the guide wheels while in engagement with the sheets. The sheet engaging members referred to are fingers 16 spaced apart upon the conveyer chains 6 at suitable intervals and connected to the links of said chains by pivots 17. The fingers are of approximately L-shape, the lower arm of each finger receiving the pivot 17 at its forward end, as seen most clearly in Fig. V. The heel 18 of each finger, which is located at the rear of the point of pivotal attachment of the fingers of the chain, is adapted to ride upon the guide bar 10 in which the chain operates so that the bottom of said guide bar serves to prevent backward movement of the finger during forward movement of the conveyer chain. To prevent the finger from accidentally following in a forward direction relative to the direction of movement of the conveyer chains, each finger is provided at its heel with a pin 19 that normally occupies a position beneath the link of the conveyer chain to which the finger is pivoted. As the sheet engaging fingers move into the chain guide bars 10 after passing upwardly around the drive wheels 8 at the rear end

of the feeding mechanism, their heels engage the bottoms of said guide bars to properly position the fingers for sheet engaging action, this positioning of the fingers taking place at a point rearward from that at which the sheets are laid upon the table bars 11. Then, during the continued movement of the conveyer chains, the fingers 16 operate positively against the sheets and cause them to ride forwardly on the supporting bars 4 and 5 while their ends travel in the guides 13.

It will be noted that the guide bars 10 are discontinued just back of the guide wheels 7 and readily understood, by reason of this fact, the sheet engaging fingers will, as they pass over the rear ends of the guide bars, fall by gravity from the sheet engaging position seen in full lines, Fig. V, to the inactive position seen in dotted lines Fig. V. This movement of the fingers is possible, due to the preponderance of weight of the fingers being located back of the points of pivotal connection of the fingers 2 with the conveyer chains. It will be clear from the foregoing that when the fingers partake of the movement stated, they pass beneath the sheets they had previously engaged and fed forwardly without bending the sheets or injuring them in any manner, and that thereafter the fingers will continue to travel with the conveyer chains, moving over and around the guide wheels and returning to the rear end of the feeding mechanism, ready to perform their offices with respect to succeeding sheets to be fed through the mechanism.

The feeding devices I have thus far described are auxiliary to devices for feeding the sheets to the feed rollers *a* and are intended to conduct the sheets to the feeding members reciprocatory in action that deliver them to the feed rollers.

20 designates guide rods supported in part by the side frames 1 of my feeding mechanism, and in part by the frame of the printing press A.

21 are feeder heads slidably mounted on the guide rods 20 and adapted to ride to and fro thereon toward and away from the feed rollers *a*. Reciprocatory movement is imparted to the feeder heads through the medium of a cam wheel 22, a lever arm 23 cooperable directly with said cam wheel and fixed to a rock shaft 24, levers 25 also fixed to said rock shaft, and connecting rods 26 uniting the feeder heads to the levers 25. The feeder heads 21 support and carry cross rods 27 and 28, said rods being rigidly mounted in the feeder heads.

29 are feeder arms loosely mounted upon the rod 27. These feeder arms are yieldingly sustained in upright positions by springs 30 arranged on adjusting rods 31 mounted in collars 32 loosely fitted to the rod 28. The adjusting rods are fitted at their forward ends to the feeder arms 29, and the feeder arms being backed by the springs 30 may yield rearwardly when force sufficient to overcome the spring 30 is imposed upon the feeder arms. The parts 20 to 32, inclusive, are known by me to be old and no invention *per se* is herein claimed for them. These parts, with the exception of the guide rods 20, constitute a carriage that is operable on said guide rods, and such carriage is adapted to partake of sufficient movement to provide for the feeder arms 29 being conducted at the end of the rearward movement of the carriage to a point rearward from that at which the sheet engaging fingers 16 of the conveyer chains 6 become separated from the chains fed thereby. The feeder arms 29 are of service in feeding the sheets forwardly to the feed rollers of the printing press during the forward movement of the reciprocating carriage but, inasmuch as the supports and guides for the sheets extend horizontally, it is unfeasible to utilize the rigid feeder arms and feeder members that directly engage the sheets, this being due to the fact that the feeder arms must return in the same path as that partaken of in their forward movement, and succeeding sheets are fed forwardly by the endless conveyers during the rearward movement of the carriage. This being true, the sheets would be injured by the feeder arms upon the return movements of the carriage if an attempt were made to feed the sheets by direct engagement of the feeder arms therewith. To feed the sheets forwardly in an efficient manner and to avoid injury to the sheets during the return movement of the carriage including the feeder arms, I have provided sheet engaging fingers 33 that are pivoted intermediate of their ends at 34 to the feeder arms 29. These fingers 33 are normally sustained in upright positions by weak springs 35, and their upper ends are prevented from moving rearwardly due to the provision of stops 36 carried by the feeder arms and engaged by the lower arms of the fingers. The fingers 33 partake of whatever movement is partaken of by the feeder arm 29 during the forward movement of the reciprocating carriage and, as a consequence, the sheets are fed positively to the feed rollers of the printing press A the same as they would be in the absence of the fingers and direct engagement between the feeder arms and the sheets. Upon the return movement of the reciprocating carriage, the feeding fingers 33 are readily deflected downwardly and forwardly when they move into engagement with an advancing sheet being fed toward the printing press by the endless conveyer, the sheet passes over the fingers, and the fingers resume their normal operative position ready to engage the

sheet upon the forward movement of the reciprocating carriage.

It is obvious that constructions other than that just described may be utilized to provide for the sheet engaging members of a reciprocatory feeder moving in a feeding force in one direction and then passing beneath succeeding sheets on their return strokes. In Fig. VIII I have shown a modification of the reciprocatory feeder illustrated in detail in Fig. VII. This modification comprises a carriage rod 27′ that may be moved to and fro with other carriage members, such as the feeder heads 21 operable on the guide rods 20. It also comprises tubular vertical boxes 37 fixed to the rod 27′ and in which are vertically movable sheet engaging fingers 33′ operable in the boxes 37 and provided with pins or studs 33ª movable in vertical slots 38 in the boxes 37. The fingers 33′ are normally upheld by springs 39 in the boxes 37 so as to properly position them to provide for their engaging the sheets to be fed during the forward movement of the fingers toward the feed rollers *a* of the printing press.

40 is a stationary frame located in proximity to the feeding members just described. This frame includes side members 41 having upper horizontal runway faces 42, at the rear ends of which are downwardly and forwardly inclined runway faces 43. The sides of the frame 40 serve as supports for brackets 44, to the lower ends of which gates 46 are pivoted at 45. The gates 46 have upper straight runway faces 47 and forwardly inclined faces 48. The gates are normally upheld by springs 49, so that their bottom faces are parallel with the bottom faces of the sides of the frame 40. Their top runway faces 47 are substantially parallel with the horizontal runway faces 42. The angles of the inclined faces 48 at the forward ends of the gates are different in degree to the angle of the inclined runway faces 43 at the sides of the frame 40; and, therefore, when the gates are in uplifted positions, the lower forward corners of the gates rest against or in close proximity to the lower ends of the runway faces 43, while the space between these members gradually widens toward the runway faces 42 and 47.

In the practical use of this feeding device, the fingers 33′ are carried forwardly during movement of the rod 27′, and the fingers act to feed the sheets while the pins 33ª are traversing the horizontal runway in the frame 40 between the runway faces 42 and the upper edges of the gates 46. As the fingers 33′ approach the limit of their forward movement, the pins 33ª engage the inclined runway faces 43 and move downwardly thereagainst whereby the fingers are lowered until they are completely withdrawn from engagement with the sheet being fed thereby, this withdrawal of engagement taking place substantially at the moment that the sheet is caught by the feed rollers of the printing press. The pins 33ª then continue to travel down the inclined runway faces, during which movement they act to lower the gates 46 by impingement against their inclined faces 48. The gates are, therefore, lowered from the position seen in full lines in Fig. VIII to the position seen in dotted lines, and immediately after the pins have reached the lower ends of the inclined faces 43, the gates are restored to their normal uplifted positions by the action of the springs 49 which constantly exert an upward pull thereupon. The gates being closed, the pins 33ª are permitted to travel rearwardly beneath the gates during the return movement of the carriage rod 27′ and the parts carried thereby, the pins being released as they reach the forward ends of the gates and allow the sheet engaging and feeding fingers to be again elevated to their operative positions ready for sheet feeding action upon the next forward movement of their reciprocatory carriage.

It is highly important that the sheets be fed in a printing mechanism of the kind to which my invention relates so that they will be properly guided just previous to and at the moment of their delivery by the feeding mechanism, to the feed rollers of the printing press, in order that they will be brought uniformly to the printing form. With this in view, I provide the guides 13 with guide extensions 13ª having open sides and which bridge the space between the reciprocating feeding device and the endless feeding device and extend substantially to the feed rollers of the printing press. I also provide gaging devices that accurately adjust the sheets transversely of the feeding mechanism just before the sheets enter between the feed rollers. These gaging devices are shown in Figs. I, II, IX and X, and comprise the following elements: 50 is a gage supporting bar, loosely supported, preferably by the side arms of the printing press and arranged transversely of the feed rollers *a* and the sheet feeding mechanism.

51 and 52 are gage blocks, slidably arranged in the transverse bars 50 and having vertical work faces that are adapted to be engaged by the edges of the sheets which project through the open sided guide extensions 13ª. These work faces of the gage blocks being vertical, the sheets ride thereagainst while traveling through the guide extensions 13ª without any tendency of the sheets to move upwardly or downwardly while in contact with the gage blocks and, as a consequence, the sheets are fed readily and uniformly through the guide extensions as they approach the feed rollers of the

printing press. One of the feed blocks, for example, at 50, is backed by a cushion spring 53 and the feed block has slot and pin connection, as seen in Figs. IX and X, with its operating slide 54. There is an operating slide 54 for each of the gage blocks that causes these gage blocks to be moved in opposite directions to properly adjust the sheets as they pass through the guide extensions 13ª. The transverse bar 50 that supports the gage blocks 51 and 52 is so mounted as to move forwardly and backwardly relative to the feed rollers *a* and, during these backward and forward movements, the gage blocks are moved inwardly and outwardly relative to the sheets fed between them due to the movement of pins 55 carried by the slides 54 in L-shaped slots 56 located in the printing press frame beneath the runway faces on which the transverse bar 50 operates. The forward and backward movements of the transverse bar 50 are obtained by the operation of levers 57 connected to said bar and operable by the cam wheel 22.

I claim:—

1. In a sheet feeding mechanism for printing presses, a reciprocating feeding device, an endless auxiliary feeding device leading to said reciprocating feeding device, and guides through which the sheets are adapted to travel continuously while being fed by both of said feeding devices, said guides bridging the space between the reciprocating feeding device and the auxiliary feeding device and constituting means for holding the sheets while they are being released from the endless feeding device and picked up by the reciprocating feeding device.

2. In a sheet feeding mechanism for printing presses, a reciprocating feeding device, an endless auxiliary feeding device leading to said reciprocating feeding device, guides bridging the space between the reciprocating feeding device and the auxiliary feeding device and through which the sheets are adapted to travel while being fed by both of said feeding devices, the portions of said guides at the location of the reciprocating feeding device being open sided, gages alongside of the open-sided portions of the guides against which the side edges of the sheets ride while moving through said guide portions, and means for moving said gages into engagement with the side edges of said sheets.

3. In a sheet feeding mechanism for printing presses, a reciprocating feeding device, an endless conveyer, table bars on which the sheets are laid before they are engaged by said conveyer, guides bridging the space between the reciprocating feeding device and the conveyer, extending forwardly from said table bars and having horizontal channels therein, the guides being provided with rearwardly projecting gage members parallel with the side walls of the guides, and the side walls of the guides being provided at their sheet receiving ends with inclined faces leading forwardly from said gage members and adapted to centralize the sheets transversely of the feeding mechanism as they move forwardly upon the table bars between the gage members and enter into the guides.

4. In a sheet feeding mechanism for printing presses, a reciprocating feeding device, an endless conveyer, guides bridging the space between the reciprocating feeding device and the conveyer, a runway member on which said endless conveyer is operable, and sheet engaging fingers pivoted to said conveyer, said sheet engaging fingers being arranged to ride upon said runway member while in sheet feeding action, and being provided with heels having stop pins for engagement with said conveyer to prevent the fingers from turning forwardly upon their pivots, said stop pins being located below the endless conveyer when it is traveling on the runway member, so as to allow said fingers to drop below the sheets when said fingers reach the end of the runway member.

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In the presence of—
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