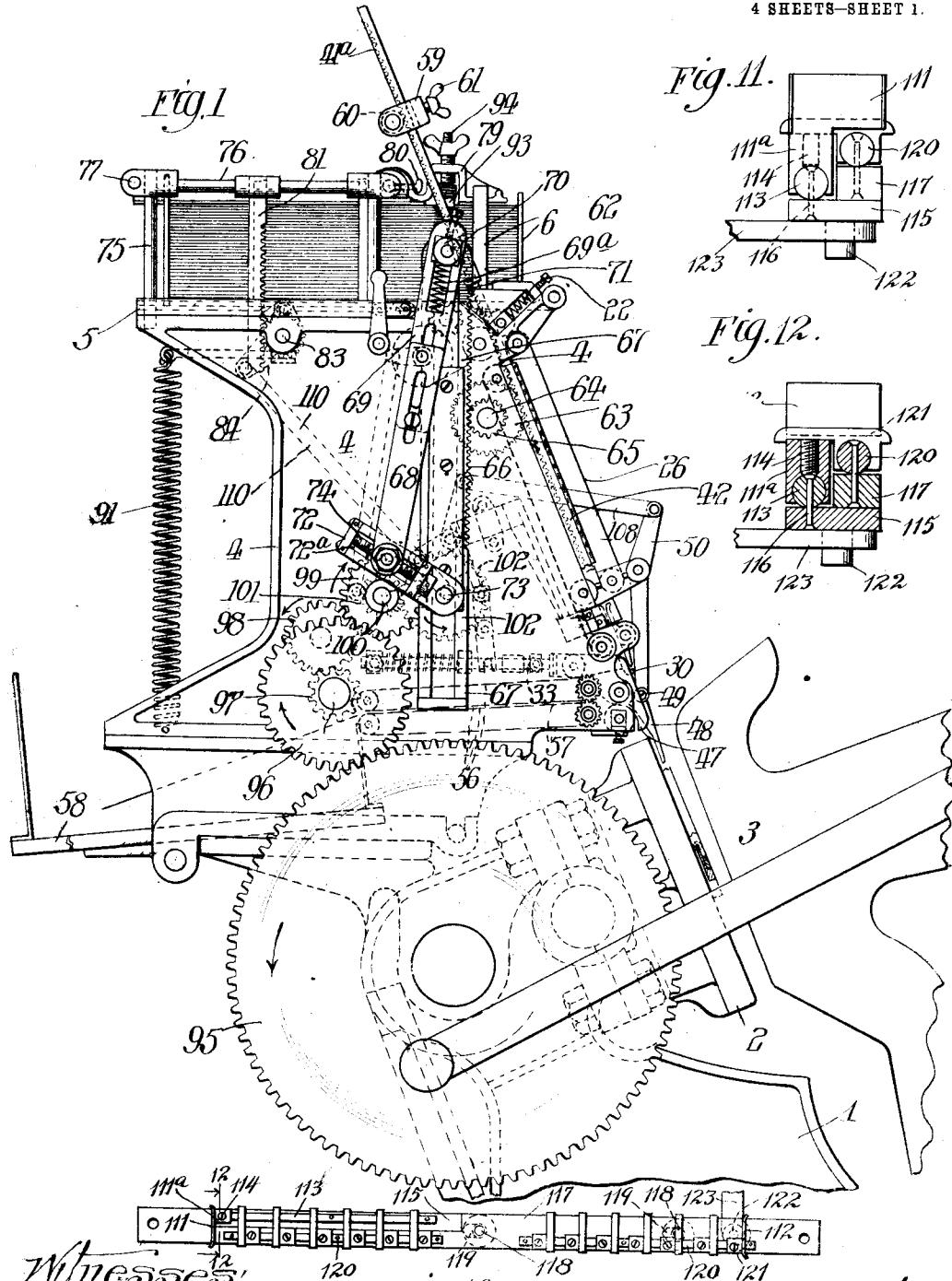


K. F. KIRKMAN.
PRINTING PRESS.
APPLICATION FILED JAN. 20, 1908.

1,031,344.

Patented July 2, 1912.

4 SHEETS—SHEET 1.



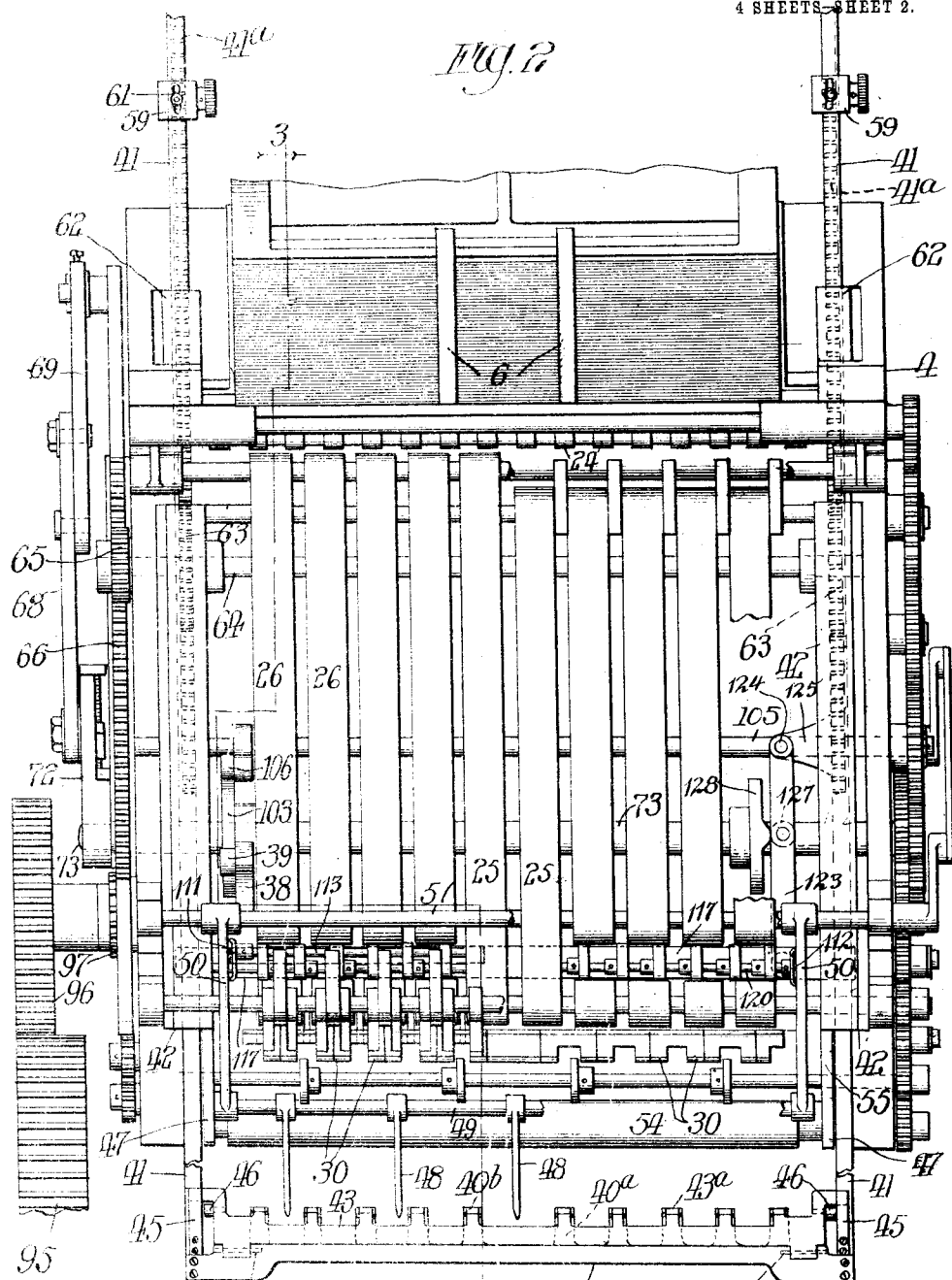
Witnesses:
H. G. Barrett
Louis B. Erwin

Fig. 10.

Inventor:
K. F. Kirkman
By Hector H. Davis
Jest 11/12

1,031,344.

4 SHEETS-SHEET 2.



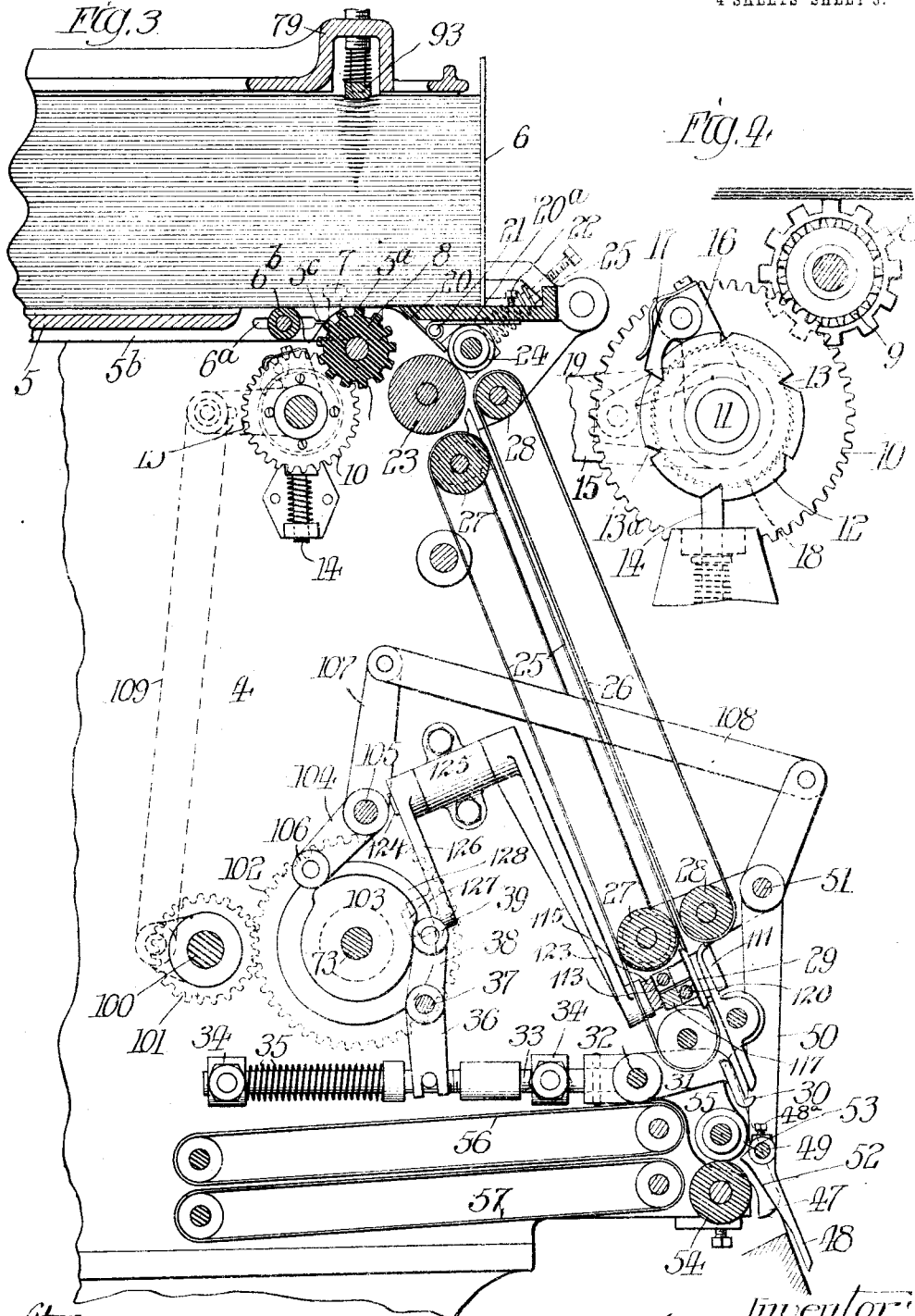
44
Inventor:
Larl F. Kirkman
Pectoral Muscles
11.5 Cttus

K. F. KIRKMAN.
PRINTING PRESS.
APPLICATION FILED JAN. 20, 1908.

1,031,344.

Patented July 2, 1912.

4 SHEETS-SHEET 3.



Witnesses:
H. Barrett
Louis B. Erwin

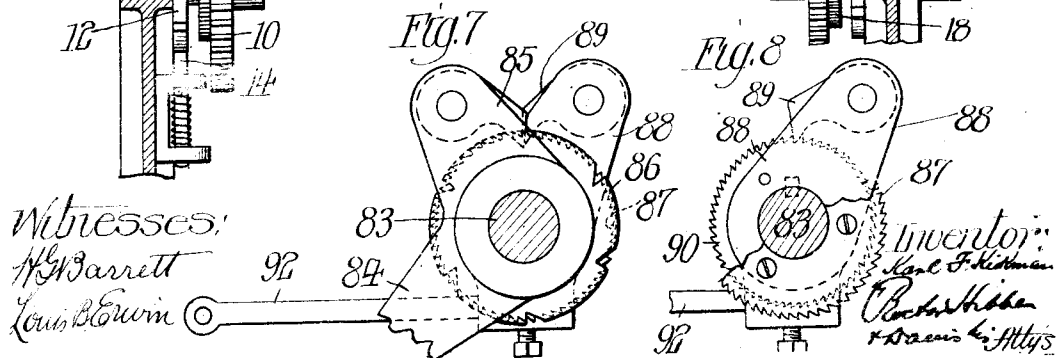
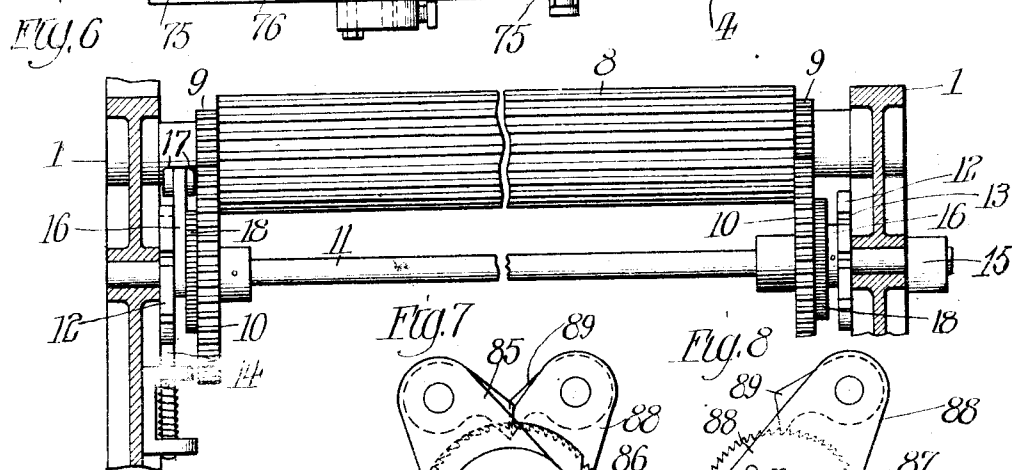
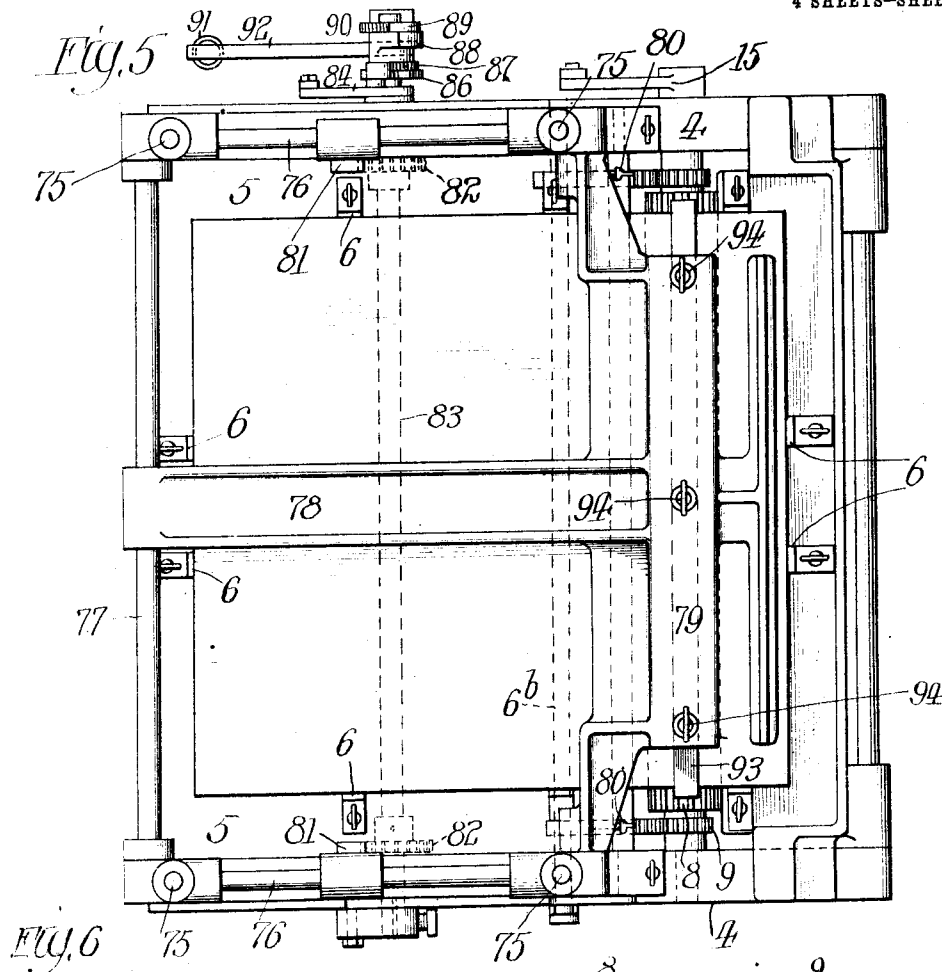
Inventor:
Karl F. Kirkman
By Victor William Davis
his Att'y

K. F. KIRKMAN.
PRINTING PRESS.
APPLICATION FILED JAN. 20, 1908.

1,031,344.

Patented July 2, 1912.

4 SHEETS—SHEET 4.



Witnesses:
H. Barrett
Louis Brown

Inventor:
K. F. Kirkman
Robert H. Hoken
Attorneys

UNITED STATES PATENT OFFICE.

KARL F. KIRKMAN, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
AUTOMATIC PRESS FEEDER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF
ILLINOIS.

PRINTING-PRESS.

1,031,344.

Specification of Letters Patent.

Patented July 2, 1912.

Application filed January 20, 1908. Serial No. 411,677.

To all whom it may concern:

Be it known that I, KARL F. KIRKMAN, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Printing-Presses, of which the following is a specification.

My invention relates to printing presses and the object thereof is to provide novel and efficient automatic means for supplying sheets of paper to the printing mechanism of the press and for delivering the printed sheets therefrom. These means may be incorporated in a new printing press as an integral part thereof, or may be built as an attachment to be applied to printing presses already in use, particularly those presses of the Gordon type.

The various features of novelty and utility in my invention will be made apparent by the description hereinafter given.

In the drawings, Figure 1 is a side elevation of a portion of a printing press with my attachment applied thereto, the printing press shown being of the Gordon type and with the platen made immovable; Fig. 2 a front elevation of my device or attachment but on a larger scale than that of Fig. 1; Fig. 3 a sectional elevation on the irregular line 3—3 of Fig. 2; Fig. 4 a detail view of the fluted or corrugated roller for taking off the bottom sheet from the pile of paper; Fig. 5 a plan view of the paper supply box and its attachments; Fig. 6 a detail view of the fluted roller and its operating mechanism viewed from the front of the machine; Figs. 7 and 8 detail views of mechanism for automatically applying tension or pressure to the pile of sheets of paper in the supply box as the sheets are fed therefrom; Fig. 9 a detail view of the jaws for gripping the paper and transferring the same to the printing mechanism of the press; Fig. 10, a detail view of a portion of the side registering mechanism; Fig. 11, a detail view on a larger scale, looking at the left-hand end of Fig. 10; and Fig. 12, a section on the line 12—12 of Fig. 10.

Referring to the present embodiment of my invention as illustrated in the drawings, I have shown my invention in the form of an attachment which is applied to and mounted upon the frame 1 of a Gordon printing press with the exception that the platen 2 thereof, instead of being movable

as is usual is blocked or made immovable, the type bed 3 being movable in the ordinary way. It will be understood, however, that the particular type or style of printing press is immaterial and that my invention, as hereinbefore stated, may be built as an integral part of the printing press structure or as an attachment, but for the purposes of an understanding of my invention I will proceed to describe the same as an attachment to this Gordon press modified as stated.

My attachment is provided with a main frame 4 which is secured in suitable manner to the printing press frame and forms the support for the different working parts of the attachment. At the upper end of this frame 4 I provide a box or receptacle for the supply or pile of sheets of paper which are to be fed from the bottom, delivered to an inclined conveyer mechanism or feed way, received by a transfer mechanism and transferred thereby to the printing mechanism of the press and thence delivered from the press by a conveyer mechanism acting at an angle to said inclined conveyer mechanism or feed-way and delivered by preference to a so-called jogger, all of said movements being automatic in their operation. Referring to the details of the construction, this supply receptacle is formed by a bottom or base portion 5 and a series of upright portions or guides 6 for retaining the paper therein. Near one end of the receptacle the bottom 5 is provided with a transverse slot 5^a, the same being near the right hand end of the receptacle when viewed as in Figs. 1 and 3, with the result that the bottom sheet of paper is always exposed therethrough. In order to adjust the width of this slot so far as the action of the fluted roller herein-after described is concerned, I provide a roller 6^b which is adjustable in slots 6^a in the depending flanges 5^b of the bottom of the box, Figs. 1 and 3. For the purpose of holding this roller 6^b in adjusted position the flanges 5^b are slit at 5^c and thumb-screws 7 are provided for closing or opening said slit, thereby clamping or unclamping the roller 6^b in its slots.

Immediately below the transverse slot 5^a in the paper supply receptacle, I arrange a fluted or corrugated roll 8 in such position that its outer surface, which may be made of rubber or other suitable material will contact and engage the bottom sheet of paper

for the purpose hereinafter explained. This roll 8 is designed to oscillate first in an anti-clockwise direction, so as to move the right hand end of the paper to the left and to buckle the same between itself and the roller 6^b, as shown in Fig. 3, after which the roll 8 is oscillated in the opposite direction, that is in a clockwise direction, for delivery to the conveyer mechanism or feed-way hereinafter explained. For the purpose of so oscillating this roll 8 I provide the same on each end with a pinion 9 which meshes with gears 10, which are mounted upon the opposite ends of a shaft 11. Upon this shaft, at the left hand side of the machine viewed as in Fig. 6, is loosely mounted a ratchet 12 having a series of alternating deep notches 13, and shallow notches 13^a, and provided with a spring-pressed stop 14 coöperating with said notches to hold the ratchet with a yielding pressure in the different positions to which it is moved, as hereinafter explained. Secured upon the shaft 11 at the other side of the machine is a rock arm 15; and said shaft 11 is provided near each end with a pawl carrier 16, the one at the left hand side having a wide pawl 17 which is spring pressed toward the edge of the ratchet disk 12 and adapted to coöperate with the ratchet teeth thereof. Parallel with this ratchet disk is a ratchet wheel 18 which is secured to one gear 10 and with which the pawl 17 also coöperates. This pawl is intended to drive gear 10, which in turn drives fluted roller 8 by its engagement with the ratchet wheel when it is in one of the deep notches, but is held out from the ratchet wheel and prevented from driving when in any other position, as for instance in one of the shallow notches. The arm 15 is adapted to be oscillated or rocked by driving connections hereinafter explained, with the result that the ratchet wheel will be driven by the pawl when in engagement therewith as shown in Fig. 4. When the parts are in the position shown in this figure and the arm 15 is rocked downwardly, the ratchet wheel 18 will be oscillated substantially sixty degrees, thereby oscillating the gear 10 and the roll 8. When the rock arm 15 is restored to the position shown, this pawl 17 will be withdrawn from the deep notch in which it originally rested and at the end of the movement of the rock arm 15 will drop into the next adjacent notch which is a shallow one.

The mechanism just described is designed to actuate the roll 8 in its anti-clockwise movement only, a similar but reversed ratchet mechanism being provided at the opposite end of the roll to actuate it in the other direction. To this end the shaft 11, which extends across the machine, is at the opposite end provided with the similar but reversed ratchet disk and ratchet wheels and also a pawl 19 working in a direction oppo-

site to that of the pawl 17, Fig. 4. When therefore, the pawl 17 is making the idle movement just described the other pawl 19 is active and is oscillating the roll 8 in the opposite direction to restore it to the normal position ready for engaging the next sheet of paper.

When one end of the bottom sheet of paper has been moved to the left, as stated, its extreme right hand end when moved to the right by the return oscillation of the roll 8 will engage below the stripping fingers 20 which are spring-pressed or adjustable toward the bottom of the pack or pile of sheets of paper, as clearly shown in Fig. 3. In the present instance these fingers are made from sheet metal which is stamped to provide a bearing around a cross-rod 21 and also an extension 20^a bearing on the under side of the bottom of the paper receptacle. To adjust the tension of these spring fingers I provide adjusting screws 22 passing through the bottom of the paper receptacle and adapted to bear against the extensions 20^a of such fingers. By means of these fingers the paper will be stripped from the box and the roll and will be guided downwardly and presented to the two feed rolls 23 and 24, the latter of which is adjustable toward and away from the other roll and is also held toward such other roll with a yielding pressure, as by means of a spring 25. The paper is now fed by these feed rolls into an inclined feed way which is formed by the upper and lower carrying tapes 25 and 26 which run over the pairs of pulleys 27 and 28 and are operated in any suitable manner. The lower central pair of carrying tapes are extended farther than the remaining tapes, as seen in Fig. 2, this provision being made for the purpose of enabling the side registering mechanism 29 to operate. The paper is fed downwardly between these conveying tapes until it comes to rest against the series of stop fingers 30, which not only arrest its further movement temporarily but also aline the same so that its lower edge shall be in perfect register and in proper position to be presented to the transfer device and to the printing mechanism of the press. These stops 30 are formed at the ends of a series of fingers 31 which extend from and are secured to a cross-rod 32 which forms part of a frame bodily removable to the left (Fig. 3) for the purpose of withdrawing the stops from the paper when the transfer mechanism is about to act thereupon. At the sides of this movable frame parallel rods 33 are provided, the same sliding in pairs of bearings 34. This frame and consequently the fingers 30 are held to their normal active position with a yielding pressure as by means of the coiled spring 35 against which the frame is positively moved in the withdrawing operation by means of the rock

arms 36 which are secured to the rock shaft 37 extending transversely of the machine and provided at one end with an arm 38 carrying at its upper end a cam roller 39. This cam roller is operated by means of a cam wheel which will be described when the driving connections of the machine are explained.

For the purpose of transferring the paper from the stops 30 to the printing mechanism of the press I provide a transfer device which is in the form of a U-shaped frame comprising the cross member or strip 40 and two parallel strips 41, the upper portions of which are in the form of rack bars as hereinafter described. This transfer device is adapted to move up and down in a plane parallel with and substantially coinciding with the plane of the inclined feed way. The transfer device is adapted to be operated by driving connections hereinafter explained, the rack bars being adapted to slide in suitable bearings 42 at opposite sides of the machine. The cross strip 40 constitutes one of the gripping jaws for engaging the bottom edge of the paper and to this end such strip is provided with a series of jaw members 40^a projecting upwardly and adapted to cooperate with similar jaw members 43^a of a strip 43. This latter strip or plate 43 is pivoted upon the strip or plate 40 upon the pintles 44, Fig. 2, and is held pressed with a yielding pressure against the other strip by means of the springs 45 arranged at opposite ends of said strips, with the result that the gripping jaws are closed under normal conditions.

After a sheet of paper has been delivered to the stops 30 the transfer device is moved upwardly and just before the jaws reach the bottom edge of the paper the rollers 46 at opposite ends of the upper member or strip 43 of the jaws will contact with the cam plates 47 which form a part of the movable frame for the stops, with the result that the jaws will be opened and then will be permitted to close to grip the paper immediately upon the withdrawal of the stops 30 in the manner already explained, after having forced the paper upwardly slightly in order that the same may be brought into proper register with the transfer device. As illustrated in detail in Fig. 9, the lower members of the jaws are provided with a series of pins 40^b which are preferably in pairs and between which the upper jaws operate. These pins act as registering pins for the bottom edge of the paper so that the same will be gripped and held by the transfer device in proper registered position. The transfer device will now move downwardly and present the paper to the printing mechanism of the press, after which it will move upwardly again to deliver the paper to the delivery mechanism and to engage another sheet of paper. In

this operation it is necessary to deflect the paper from the plane of its previous course so as to be delivered at an angle to the delivery mechanism, which is here shown as substantially horizontal and therefore at an angle to the plane of the feed of the paper to the press. To this end I provide a series of deflecting fingers 48 which depend from the lower cross rod 49 of a bodily movable and oscillating frame or bail whose parallel side members or arms 50 are secured at their upper ends to the rock shaft 51. This rock shaft is operated in proper time in comparison with the other mechanism by driving connections hereinafter explained. The inner faces of these deflecting fingers 48 are parallel with the platen as to their lower ends as illustrated in Fig. 3 and are of sufficient length as to lap from the upper edge of the paper while it is being printed, so that when the transfer device moves upwardly the paper will move on the inner sides or faces of these deflecting fingers and will be guided or deflected laterally to the left (Fig. 3) by means of the upper portion 52 of the inner faces of such fingers which are inclined toward the left, the same terminating in points 53 which deliver the paper to the delivery rolls 54 and 55. The paper is now delivered by these rolls to the series of delivery tapes 56 and 57, by which the paper is delivered from the machine or into the ordinary and well-known jogger 58 as illustrated in Fig. 1. It will be understood that the deflecting fingers 48 must be moved bodily out of the way of the transfer device in its movements and for this reason these fingers are mounted upon the oscillating frame or bail hereinbefore referred to. When the paper has been gripped by the transfer device and is about to be fed downwardly to the press, the timing of the mechanism is such that these deflecting fingers will be moved bodily outwardly out of the path of the movement of the paper and when the transfer device has stopped these deflecting fingers will be moved back to their active position shown in Fig. 3, in order to operate as deflectors for the paper in the manner already explained. These guide or deflecting fingers 48 are angularly adjustable with respect to their frame, inasmuch as they may be individually adjusted to different angular positions on their cross shaft 49 and held in adjusted position by the set screws 48^a. In this manner and by these means the sheets of paper are successively and automatically fed from the supply receptacle or pile of sheets to the printing mechanism of the press and thence delivered, also in automatic manner, from the machine or into the usual jogger.

For the purpose of adjusting the degree of downward movement of the transfer device so as to bring the paper in proper posi-

tion or register I provide suitable means which serve to limit said downward movement at any predetermined point. In the present instance such means comprise a pair of stops 59 which by preference are provided with small pinions 60 adapted to cooperate with the rack 41^a on which it is adjustable up and down, this rack being the one used for actuating the transfer device.

10 For holding these stops in their adjusted position a thumb screw 61 is employed. As will now be obvious, it is necessary to provide a yielding driving connection in the operating mechanism which actuates the transfer device for checking up the movement of the operating connections after the stops have come in contact with and have been arrested by an immovable part of the machine frame, in the present instance the upper set of bearings 62 for the rack bar, as clearly illustrated in Fig. 2. To this end I provide such a yielding device in the operating connections about to be described. The arms or rack bars 41 are moved up and down by means of a pair of large pinions 63 secured to the cross shaft 64, which shaft is also provided with smaller pinions 65. These latter pinions mesh in the rack 66 of a vertically movable frame 67 as clearly illustrated in Fig. 1. At its upper end this sliding frame 67 is pivotally connected through the medium of a connecting rod made in two portions 68 and 69 which have pin and slot connections for the purpose of adjusting the length of the connecting rod. The pivotal connection between this sliding frame and the connecting rod is formed in a bearing box or journal 70 slidable vertically in a slot 69^a extending longitudinally of the connecting rod. In order to keep the journal in its uppermost position at the upper end of the slot I provide a coiled spring 71 arranged in said slot, this spring forming the yielding connection. The lower end of the connecting rod is pivotally connected to a crank arm 72 secured to the cross shaft 73 which is operated in the manner explained when the driving connections generally are operated. Provision is made for adjusting the pivotal connection of this connecting rod with its crank arm toward and away from the axis of rotation of such crank arm, that is the shaft 73, and to this end said pivotal connection is slidable longitudinally of the crank arm in a slot 72^a therein, in which is arranged an adjusting screw 74 passing through a portion of such pivotal connection, with the result that when the adjusting screw is rotated in one direction or the other the pivotal point of the connecting rod is adjusted or moved in or out, as the case may be. It will now be seen that when the stops 59 are adjusted to such a position that they will strike the bearings 62 before the transfer device has reached a lower posi-

tion, to which it would normally be carried by the driving connections, the strain or pressure communicated by the driving connections will be taken up and absorbed by the spring 71 so that the transfer device will be relieved of such strain. 70

The supply receptacle, in the present instance, and by preference, is provided with means for applying pressure upon the pile of sheets and provision is made for keeping this pressure uniform notwithstanding the removal of sheets from the bottom of the pile. Provision is also made for an additional pressure on the pile of sheets at a point immediately above and in line with the fluted or corrugated roll hereinbefore described so that such roll may easily grip and feed the paper in the manner hereinbefore described. As shown, particularly in Figs. 1 and 5, the frame 4 of the attachment is provided with a series of upright guide rods 75 which form the guides for a horizontal frame consisting of the two parallel or side members 76 and the end member 77. A supplemental frame is also provided to rest upon the pile of sheets, said frame being substantially T-shaped, as shown in Fig. 5, and comprising a member 78 pivoted to the cross rod 77 of the main frame and another or cross member 79. This T-shaped frame is normally secured to the main frame in suitable manner, as by means of the set screws 80, adapted to bear directly against the latter frame, so that in the normal operation of the parts the two frames act substantially as one, but are separate to permit the supplemental frame to be folded back to admit a new supply of paper. This frame, which may be termed a pressure frame, is designed to be automatically moved downwardly as the sheets of paper are removed from the receptacle or rather as, in the present instance, such frame is moved downwardly a certain extent upon the removal of every ten sheets. To this end the pressure frame is provided at opposite sides with two parallel depending rack bars 81 which mesh with pinions 82 secured to a cross shaft 83 extending below the paper receptacle as shown in Figs. 1 and 5. 115

A bell crank lever 84, which is adapted to be oscillated in a manner hereinafter described, is loosely mounted upon the shaft 83 and provided on one of its arms with a pawl 85, which is adapted to cooperate with the two ratchets 86 and 87, both of which are loose upon said shaft. The ratchet 86 is what I term a hold-out ratchet, inasmuch as it is designed to hold out the pawl 85 from the ratchet 87 except for one stroke in ten of the bell crank 84. For this purpose the hold-out ratchet is provided with a series of deep teeth corresponding to each tenth tooth, such deep teeth extending inwardly such distance that the pawl 85 will coop- 130

erate jointly with both of the ratchets. The ratchet 87 is secured to an arm 88, also loosely mounted upon the shaft 83, and provided with a pawl 89. This pawl is adapted to cooperate with a third ratchet 90 which is secured to the shaft 83. This arm 88 is held spring-pressed with a constant tension by means of the spring 91 which transmits its pressure to the arm 88 through the medium of the tension rod 92. When the ratchet 87 is moved one tooth, as described, the arm 88 will be correspondingly moved in a clockwise direction when viewed as in Fig. 8, so that the pawl 89 will engage the next tooth to the right and the tension of the spring will cause the ratchet 90 to be moved the distance of one tooth, thereby maintaining upon the pile of sheets a uniform tension, it being understood that the tension of the spring 91 is communicated through the parts described and through the cross shaft to the racks and the pressure frame.

For the purpose of securing additional or increased pressure upon the pile of sheets along a line corresponding to the bottom opening in the paper receptacle I provide a pressure bar 93 which is located below the cross portion 79 of the swinging frame. In order to adjust the tension of this pressure bar to the required degree I provide a series of set screws 94 as shown in Figs. 1 and 5. The result of this increased pressure is to slightly buckle the entire pile of sheets, particularly the lowermost sheets, along the line where the same are presented to the feed roll.

Now describing the driving connections for the various mechanisms which have been explained, power is communicated from the large driving gear 95 through the series of gears and pinions 96, 97, 98, 99 to drive the shaft 100. This shaft extends transversely of the machine and is provided with a pinion 101 meshing with a gear 102. This gear is adapted to drive a train of gears (shown in Fig. 2 but not necessary to be described) for driving the conveyer mechanisms. Inasmuch as the gear 102 is secured to the shaft 73, hereinbefore described, the crank arm 72 and consequently the transfer device are actuated in the manner already explained. Upon the same shaft 73 is secured a cam 103 (see Fig. 3) which is adapted to operate both the stop fingers 30 and the deflecting fingers 48 in the following manner: An arm 104 is secured to a rock shaft 105 and provided at its free end with a cam roller 106 which cooperates with the cam surface of said cam 103, with the result that the shaft 105 will be rocked and the motion thereby communicated to the frame or rail 50 through the medium of the arms and links 107 and 108, all as clearly indicated in Fig. 3. Now referring to the driving connection for the stop fingers 30, the

cam roller 39 hereinbefore described cooperates with said cam for rocking the shaft 37 and thereby reciprocating the frame which carries said stop fingers in the manner hereinbefore explained. The rock arm 15 which actuates the oscillating roll 8 is operatively connected in any suitable manner with the shaft 100 as by means of the link 109. So also, the rock arm 84 which operates mechanism for maintaining a uniform pressure on the pile of sheets of paper is operatively connected with the shaft 73 by means of the link 110, whereby such link is given the necessary reciprocating motion.

By preference I employ a side registering device for vertically registering the paper on the feedway just before it is gripped by the jaws of the transfer device. In the present instance, and as illustrated in Figs. 2, 3, 10, 11, and 12, such registering device comprises a laterally shiftable gage 111 on the left-hand side (Figs. 2) of the feedway, which is adapted at the proper time to be moved or shifted against the left-hand side or edge of the paper to give it the proper vertical register by forcing such paper against a similar but stationary gage 112 on the right-hand side of the feedway and to be then withdrawn just as the jaws of the transfer device grip the paper and start to carry or transfer the same downwardly, in the manner hereinbefore explained. As best shown in the detail views, Figs. 10, 11, and 12, the movable gage 111 has a projecting or depending portion 111^a which is fitted upon a rod 113 and adjustably secured thereto by means of a set screw 114, which rod is in turn secured to a transversely sliding bar 115 by rivets 116. This bar, which extends transversely of the feedway, is adapted to slide upon the under side of another transverse bar 117, to which end these bars are provided with bolt and slot connections 118 and 119. The other or stationary gage 112 is secured to a rod 120 by means of a set screw 121 in a manner similar to the movable gage, said rod being secured to the stationary bar 117. The lower or sliding bar 115 has on its lower side and near its right-hand end (Fig. 2) a pivot pin 122 which is pivotally connected the lower end of an oscillating arm 123 whose upper end is secured to a rock shaft 124 bearing in a journal 125. This rock shaft is secured to a crank arm 126, rocked in any suitable manner, as by means of the cam roller 127 which is mounted at the lower end thereof and bears upon a cam surface on one side of the cam 128 secured to shaft 73. It will be understood that as the arm 123 is oscillated by the cam through the connections described, the bar 115 will be reciprocated accordingly. The parts are so timed that after the transfer device has been moved upwardly, so that its horizontal registering

pins engage the lower edge of the paper and lift the same slightly from the registering devices or stops 30, and before said jaws of the transfer devices close to grip the paper, said movable gage 111 is shifted laterally,—that is, to the right when the machine or attachment is viewed as in Fig. 2, with the result that the paper will be moved against the stationary gage 112, whereby the paper receives an accurate register or adjustment after it has been doubly registered horizontally, first by the stops 30, and then by the registering pins upon the transfer device. It will be understood that both gages 111 and 112 are adjustable upon their rods for different positions of the paper with respect to the type bed and for different widths of paper.

I claim:

1. In a printing press, the combination, with a platen, of means for feeding sheets of paper one at a time in the plane of the platen, means for registering each sheet before its delivery to the platen, mechanism reciprocable in one direction for delivering each sheet to the platen and in the other direction for delivering each sheet from the platen after the printing operation and partway along the line of feed of such paper, said mechanism being reciprocable in a fixed plane which coincides with the plane of said feeding means and with the plane of the platen.

2. In a printing press, the combination, with a platen, of means for taking off sheets of paper from a pile of sheets, stopping mechanism intermediate the printing mechanism of the press and the paper supply, means for feeding or conveying each sheet separately from the supply to the stopping mechanism, and a transfer frame reciprocable in a fixed plane which coincides with the plane of said feeding means and with the plane of the platen, said frame being arranged to grip an edge of the paper and to transfer it to the printing mechanism and also to deliver the paper after the printing operation.

3. In a printing press, the combination with a platen, of means for taking off sheets of paper from a pile of sheets, stop mechanism intermediate the printing mechanism of the press and the paper supply for stopping the paper in its transfer to the printing mechanism, said stop mechanism comprising a laterally movable frame and a projection in the path of movement of the paper from the supply to the printing mechanism, means for transferring the paper to the stop mechanism, and means for engaging the paper at the stop mechanism and feeding or conveying it to the printing mechanism in the plane of the platen and for delivering therefrom after the printing operation and partway along the line of feed of such paper.

4. In a printing press, the combination of means for taking off sheets of paper from a pile of sheets, stop mechanism intermediate the printing mechanism of the press and the paper supply for stopping the paper in its transfer to the printing mechanism, said stop mechanism comprising a laterally movable frame and a projection in the path of movement of the paper from the supply to the printing mechanism, means for transferring the paper to the stop mechanism, means for conveying the paper from the stop mechanism to the printing mechanism and for delivering the paper therefrom after the printing operation, and a guide operating during the delivery operation to direct the paper laterally from its previous line of travel, whereby the paper is delivered.

5. In a printing press, the combination, with a platen, of means for feeding the paper one sheet at a time, means for stopping the paper in its transfer to the printing mechanism, a transfer device reciprocable in the plane of the feeding means and of the platen and arranged to positively engage the paper at a point adjacent said stopping means and to convey it along said plane to the platen and also in a reverse direction partway along such plane, and means located adjacent said plane and arranged to be interposed in such plane during the delivery operation to direct the paper laterally from its previous plane of travel.

6. In a printing press, the combination, with a platen, of means for feeding or conveying the paper along a line of travel in the plane of the platen one sheet at a time, means for stopping and registering each sheet at end of said feeding means, a movable transfer device for engaging each sheet of paper and for presenting it to the platen, and a guide cooperating with said transfer device for directing the paper laterally from its previous line of travel for delivery purposes.

7. In a printing press, the combination with a platen, of means for conveying the sheets of paper one at a time from the supply or pile of sheets toward the printing mechanism of the press and in the plane of the platen, a reciprocating transfer device for engaging the sheets of paper and transferring or feeding them to the printing mechanism and subsequently transferring them partway of the line of feed and then presenting the sheet to the delivery means, delivery means for delivering the paper from the printing mechanism and means for stopping and registering each sheet before being transferred.

8. In a printing press, the combination with a platen, of means for conveying the sheets of paper one at a time from a supply or pile of sheets toward the printing mechanism of the press and in the plane of the

platen, a reciprocating transfer device for engaging the sheets of paper and transferring them to the printing mechanism and subsequently presenting the sheets to the delivery means, delivery means for delivering the paper from the printing mechanism, a guide operating during the delivery operation for directing the paper to the delivery means and means for stopping and registering each sheet before being transferred.

9. In a printing press, the combination, of means for conveying the sheets of paper one at a time from a supply or pile of sheets toward the printing mechanism of the press, a reciprocating transfer device for engaging the sheets of paper and transferring them to the printing mechanism and subsequently presenting the sheets to the delivery means, delivery means for delivering the paper from the printing mechanism, and a series of fingers which are movable to an inoperative position when the paper is being fed but restored to an operative position during the delivery operation to deflect the printed sheets to the delivery means.

10. In a printing press, the combination, of means for conveying the sheets of paper one at a time from a supply or pile of sheets toward the printing mechanism of the press, a reciprocating transfer device for engaging the sheets of paper and transferring them to the printing mechanism and subsequently presenting the sheets to the delivery means, delivery means for delivering the paper from the printing mechanism, the line or path of feed and line or path of delivery of the paper being at an angle, and a series of guide fingers movable to and from an operative position and arranged at the point of junction of said two lines, said fingers acting when in an operative position to deflect the printed paper to the line of delivery.

11. In a printing press, the combination, of means for conveying the sheets of paper one at a time from a supply or pile of sheets toward the printing mechanism of the press, a reciprocating transfer device for engaging the sheets of paper and transferring them to the printing mechanism and subsequently presenting the sheets to the delivery means, delivery means for delivering the paper from the printing mechanism, the line or path of feed and line or path of delivery of the paper being at an angle, a swinging frame, and a series of guide fingers depending from said frame adjacent the junction of said two lines, said fingers acting to deflect the printed paper to the line of delivery.

12. In a printing press, the combination, of means for conveying the sheets of paper one at a time from a supply or pile of sheets toward the printing mechanism of the press, a reciprocating transfer device for engaging the sheets of paper and transferring them

to the printing mechanism and subsequently presenting the sheets to the delivery means, delivery means for delivering the paper from the printing mechanism, the line or path of feed and line or path of delivery of the paper being at an angle, a swinging frame, and a series of guide fingers depending from said frame adjacent the junction of said two lines, said fingers being angularly adjustable with respect to their frame and acting to deflect the printed paper to the line of delivery.

13. In a printing press, the combination, of means for conveying the sheets of paper one at a time from a supply or pile of sheets toward the printing mechanism of the press, a reciprocating transfer device for engaging the sheets of paper and transferring them to the printing mechanism and subsequently presenting the sheets to the delivery means, delivery means for delivering the paper from the printing mechanism, the line or path of feed and line or path of delivery of the paper being at an angle, a swinging frame, and a series of guide fingers depending from said frame adjacent the junction of said two lines, said fingers having the inner surface at their lower ends parallel with the platen of the press and at their upper ends inclined inwardly to deflect the printed paper to the line of delivery.

14. In a printing press, the combination, with a platen, of an inclined feedway substantially in the plane of the platen, a series of registering stops at the bottom thereof, a laterally movable frame on which said stops are mounted, a transfer device movable in a fixed plane parallel with the plane of the platen and having means for engaging the paper at the stops and for conveying it to the printing mechanism of the press, and also for partially delivering the paper after printing, and means for delivering the paper at a point above the platen.

15. In a printing press, the combination, with a platen, of an inclined feedway substantially in the plane of the platen, a series of registering stops at the bottom thereof, a laterally movable frame on which said stops are mounted, a transfer device movable in the plane of the platen and having means for engaging the paper at the stops and for conveying it to the printing mechanism of the press, and means cooperating with the transfer device for diverting the paper laterally for delivery purposes.

16. In a printing press, the combination, with a platen, of an inclined feedway substantially in the plane of the platen, a series of registering stops at the bottom thereof, a laterally movable frame on which said stops are mounted, a transfer device movable in the plane of the platen and having means for engaging the paper at the stops and for conveying it to the printing mechanism

nism of the press, and means cooperating with the transfer device for diverting the paper laterally for delivery purposes at a point above the platen.

17. In a printing press, the combination, with a platen, of an inclined feedway substantially in the plane of the platen, a series of registering stops at the bottom thereof, a laterally movable frame on which said stops are mounted, a transfer device movable in the plane of the platen and having means for engaging the paper at the stops and for conveying it to the printing mechanism of the press, said device having gripping jaws to engage the lower edge of the paper during its initial or downward movement to present the paper to the printing mechanism and also during the upward or delivery movement, and means cooperating with the transfer device for diverting the paper laterally for delivery purposes.

18. In a printing press, the combination with a platen, of a feedway, mechanism at the bottom thereof for stopping and registering the paper, and a transfer device comprising a frame movable in line with said feedway and in the plane of the platen and provided with a series of gripping jaws to engage the lower edge of the paper, and a stationary cam arranged in the path of upward movement of one of the jaw members for opening the same to release the printed sheet and to place it in condition to receive the next sheet.

19. In a printing press, the combination, with printing mechanism including a stationary platen, of a transfer device reciprocable in substantially the same plane as the platen for conveying the paper to the platen and then for removing it therefrom, said device comprising a substantially U-shaped frame, whose cross portion has means for gripping the paper in said conveying and removing operations and whose parallel portions have means whereby the frame may be reciprocated.

20. In a printing press, the combination, with printing mechanism including a stationary platen, of a transfer device reciprocable in substantially the same plane as the platen for conveying the paper to the platen and then for removing it therefrom, said device comprising a substantially U-shaped frame, whose cross portion has means for gripping the paper in said conveying and removing operations, and a yielding driving connection for reciprocating said device.

21. In a printing press, the combination, with a platen, of a transfer device reciprocable in a fixed plane parallel with the plane of the platen and comprising a frame which is substantially U-shape, the cross-portion having means for gripping the paper and the two parallel portions which are in the form of rack bars, and means cooperating

with such rack bars for reciprocating said device and including a yielding driving connection.

22. In a printing press, the combination, with feeding means and with a platen, of a transfer device reciprocable in a fixed plane parallel with the plane of the platen and of the feeding means and comprising a frame which is substantially U-shape, the cross-portion having means for gripping the paper and the two parallel portions having means whereby the device may be reciprocated, and means for adjusting the limit of reciprocation of the device.

23. In a printing press, the combination, with a platen, of a transfer device reciprocable in a fixed plane parallel with the plane of the platen and comprising a frame which is substantially U-shape, the cross-portion having means for gripping the paper and the two parallel portions having means whereby the device may be reciprocated, said device being arranged to move in one direction to transfer the paper to the platen for printing and in the opposite direction to deliver the paper after printing and to thereafter grip the next paper to be printed.

24. In a printing press, the combination, with a platen, of a transfer device reciprocable in a fixed plane parallel with the plane of the platen and comprising a frame which is substantially U-shape, the cross-portion having means for gripping the paper and the two parallel portions having means whereby the device may be reciprocated, and delivery mechanism located above the platen and intermediate such platen and the upward limit of movement of the cross-portion of said device.

25. In a printing press, the combination, with a platen, of a transfer device reciprocable in a fixed plane parallel with the plane of the platen and comprising a frame which is substantially U-shape, the cross-portion having means for gripping the paper and the two parallel portions having means whereby the device may be reciprocated, and delivery mechanism located above the platen and intermediate such platen and the upward limit of movement of the cross-portion of said device, said cross-portion gripping the paper during nearly a complete reciprocation and until said device on its upward movement presents the paper to the delivery mechanism.

26. In a printing press, the combination, with a platen, of a transfer device reciprocable in a fixed plane parallel with the plane of the platen and comprising a frame which is substantially U-shape, the cross-portion having means for gripping the paper and the two parallel portions having means whereby the device may be reciprocated, delivery mechanism located intermediate the platen and upward limit of movement of

the cross-portion of said device, and means interposed in the path of upward movement of the printed paper for deflecting the same to the delivery mechanism.

27. In a printing press, the combination, with a platen, of a transfer device reciprocable in a fixed plane parallel with the plane of the platen and comprising a frame which is substantially U-shape, the cross-portion having means for gripping the paper and the two parallel portions having means whereby the device may be reciprocated, delivery mechanism located intermediate the platen and upward limit of movement of said cross-portion and at an angle to the plane of reciprocation thereof, and movable deflecting fingers for deflecting the printed paper to the delivery mechanism upon the upward movement of such paper by said device.

28. In a printing press, the combination of a feedway, mechanism at the bottom thereof for stopping and registering the paper, and a transfer device comprising a frame reciprocable in line with said feedway and provided with means for gripping the paper and also provided with a series of stop pins for stopping and registering the paper on the frame, said stop pins being movable above the plane of said registering mechanism.

29. In a printing press, the combination of a feedway, mechanism at the bottom thereof for stopping and registering the paper, and a transfer device comprising a frame reciprocable in line with said feedway and provided with a pair of plates one of which is movable toward and away from the other to form jaws, and pins located on one of the plates for stopping and registering the paper on the frame and movable above the plane of said registering mechanism.

30. In a printing press, the combination of a feedway, mechanism at the bottom thereof for stopping and registering the paper, and a transfer device comprising a frame reciprocable in line with said feedway and provided with a pair of plates, one of which is movable toward and away from the other, said plates having projecting portions to form jaws, and pins arranged on the jaw portions of one of the plates and movable above the plane of said registering mechanism.

31. In a printing press, the combination with a platen, of a feedway, mechanism arranged above the platen for stopping and registering the paper while thereon, and a transfer device for transferring the paper to the printing mechanism and comprising a reciprocating frame provided with means for gripping the paper and also provided with means for registering the paper independently of the other registering mechanism

and during its period of registration by such latter mechanism.

32. In a printing press, the combination, with a platen, of a feedway, mechanism arranged above the platen for stopping and registering the paper while thereon, a transfer device for transferring the paper to the printing mechanism and comprising a reciprocating frame provided with jaws for gripping the paper and also provided with means for registering the paper while in said jaws, but before the same grips the paper, and means for withdrawing said stopping and registering mechanism to release the paper after the action thereupon by the registering means on said transfer frame.

33. In a printing press, the combination, with a platen, of a feedway, mechanism arranged above the platen for stopping and registering the paper while thereon, a transfer device for transferring the paper to the printing mechanism and comprising a reciprocating frame provided with means for gripping the paper and also provided with a series of registering pins to contact with the bottom edge of the paper and thereby register it independently of its registration on the feedway, and means for withdrawing said stopping and registering mechanism to release the paper after being contacted by said pins.

34. In a printing press, the combination of a feedway, mechanism cooperating therewith for stopping and registering the paper while thereon, and a transfer device for transferring the paper to the printing mechanism and comprising a reciprocating frame provided with means for gripping the paper and also provided with a registering device to register the paper independently of its registration on the feedway, said frame having a degree of movement sufficient to lift the paper free from the registering mechanism on the feedway when the registering device on the frame cooperates with such paper.

35. In a printing press, the combination of mechanism for stopping and horizontally registering the paper, means for vertically registering the paper, means for delivering the paper after printing, and a transfer device movable in a fixed plane for transferring the paper to the printing mechanism to be printed and for thereafter transferring it to the delivery means.

36. In a printing press, the combination, with printing mechanism, of a reciprocating transfer device for conveying the paper in opposite directions in a fixed plane of movement, and delivery means located adjacent said plane of movement, said transfer device having means for positively gripping the paper and being arranged to transfer the paper to the printing mechanism in its move-

ment in one direction and to transfer the paper to the delivery means in its movement in the other direction.

37. In a printing press, the combination of a feedway mechanism cooperating therewith for stopping and horizontally registering the paper, a reciprocating transfer device movable in a fixed plane for transferring the paper to the printing mechanism and having means for independently registering the paper and delivery mechanism between said printing mechanism and the feedway, said device being arranged to transfer the printed paper to said delivery mechanism.

38. In a printing press, the combination of a feedway mechanism cooperating therewith for stopping and horizontally registering the paper while thereon, a reciprocating transfer device movable in a fixed plane for transferring the paper to the printing mechanism, a side registering device for engaging a side of the paper for vertically registering the same and means for delivering the paper at a point above the printing mechanism.

39. In a printing press, the combination of a feedway mechanism cooperating therewith for stopping and horizontally registering the paper while thereon, a reciprocating transfer device movable in a fixed plane for transferring the paper to the printing mechanism, and provided with jaws for gripping the paper, a side registering device for registering the paper vertically while in the jaws, and means for delivering the paper at a point above the printing mechanism.

40. In a printing press, the combination of a feedway mechanism cooperating therewith for stopping and horizontally registering the paper while thereon, a transfer device for transferring the paper to the printing mechanism, and provided with jaws for gripping the paper and also provided with registering pins, a side registering device for registering the paper vertically while on said pins and means for delivering the paper at a point above the printing mechanism.

41. In a printing press, the combination with printing mechanism including a platen, of a transfer device for engaging the paper and transferring it to and removing it from the platen, said device comprising a reciprocating frame movable substantially in the plane and across the face of the platen and provided with means for engaging the paper and means for adjusting the degree of reciprocation of the frame in one direction for positioning the paper properly with respect to the platen.

42. In a printing press, the combination of a transfer device for engaging the paper and transferring it to the printing mechanism

of the press, said device comprising a reciprocating frame provided with means for engaging the paper, and means for adjusting the degree of reciprocation of the frame for positioning the paper properly with respect to the platen, said means consisting of an adjustable stop on the transfer frame for striking a fixed point, in cooperation with a yielding driving connection operatively connected with the said frame.

43. In a printing press, the combination of a transfer device for engaging the paper and transferring it to the printing mechanism of the press, said device comprising a reciprocating frame provided with means for engaging the paper and having two parallel arms, and means for adjusting the degree of reciprocation of the frame for positioning the paper properly with respect to the platen, and said adjusting means comprising stops adjustable along the length of said arms and adapted to strike and be stopped by some fixed point, in cooperation with a yielding driving connection operatively connected with said arms.

44. In a printing press, the combination of a transfer device for engaging the paper and transferring it to the printing mechanism of the press, said device comprising a reciprocating frame provided with means for engaging the paper and having two parallel arms with fixed bearings, and means for adjusting the degree of reciprocation of the frame for positioning the paper properly with respect to the platen, and said adjusting means comprising stops adjustable along the length of said arms and adapted to strike and be stopped by said bearings, in cooperation with a yielding driving connection operatively connected with said arms.

45. In a printing press, the combination of a transfer device for engaging the paper and transferring it to the printing mechanism of the press, said device comprising a reciprocating frame provided with means for engaging the paper and having two parallel arms, means for adjusting the degree of reciprocation of the frame for positioning the paper properly with respect to the platen, fixed bearings for said arms, and racks on said arms, said adjusting means comprising stop adjustable along the length of said arms and adapted to strike and be stopped by said bearings, in cooperation with a train of driving connections operating on said racks, one member of the train being arranged to yield when the stops contact the bearings at their adjusted limit of movement.

46. In a printing press, the combination of a transfer device for engaging the paper and transferring it to the printing mechanism of the press, said device comprising a reciprocating frame provided with means for engaging the paper and having two

parallel arms, and means for adjusting the degree of reciprocation of the frame for positioning the paper properly with respect to the platen, fixed bearings for said arms, racks on said arms, and said adjusting means comprising stops adjustable along the length of said arms and adapted to strike and be stopped by said bearings, in coöperation with a train of driving connections operating on said racks, and consisting of two pinions meshing with said racks, a shaft to which such pinions are secured, a third pinion on said shaft, a second rack meshing with said third pinion, a driving crank, and a connecting rod between said crank and second rack, said connection being yielding.

47. In a printing press, the combination of a transfer device for engaging the paper and transferring it to the printing mechanism of the press, said device comprising a reciprocating frame provided with means for engaging the paper and having two parallel arms, and means for adjusting the degree of reciprocation of the frame for positioning the paper properly with respect to the platen, fixed bearings for said arms, racks on said arms, and said adjusting means comprising stops adjustable along the length of said arms and adapted to strike and be stopped by said bearings, in coöperation with a train of driving connections operating on said racks, and consisting of two pinions meshing with said racks, a shaft to which such pinions are secured, a third pinion on said shaft, a second rack meshing with said third pinion, a driving crank, and a connecting rod between said crank and second rack, said connection being made in two parts and adapted to transmit power through a yielding member.

48. In a printing press, the combination of a transfer device for engaging the paper and transferring it to the printing mechanism of the press, said device comprising a reciprocating frame provided with means for engaging the paper and having two parallel arms, and means for adjusting the degree of reciprocation of the frame for positioning the paper properly with respect to the platen, fixed bearings for said arms, racks on said arms, and said adjusting means comprising stops adjustable along the length of said arms and adapted to strike and be stopped by said bearings, in coöperation with a train of driving connections operating on said racks, and consisting of two pinions meshing with said racks, a shaft to which such pinions are secured, a third pinion on said shaft, a second rack meshing with said third pinion, a driving crank, and a connecting rod between said crank and second rack, said connection comprising two members one connected with the crank and the other with the second rack, one of said

members having a yielding connection with the part to which it is operatively connected.

49. In a printing press, the combination of a transfer device for engaging the paper and transferring it to the printing mechanism of the press, said device comprising a reciprocating frame provided with means for engaging the paper and having two parallel arms, and means for adjusting the degree of reciprocation of the frame for positioning the paper properly with respect to the platen, fixed bearings for said arms, racks on said arms, and said adjusting means comprising stops adjustable along the length of said arms and adapted to strike and be stopped by said bearings, in coöperation with a train of driving connections operating on said racks, and consisting of two pinions meshing with said racks, a shaft to which such pinions are secured, a third pinion on said shaft, a second rack meshing with said third pinion, a driving crank, and a connecting rod between said crank and second rack, said connection comprising two members one connected with the crank and the other with the second rack, the latter being slotted, a bearing located in said slot and connected with the second rack, and a spring tending to hold the bearing toward the outer end of the slot.

50. In a printing press, the combination of a transfer device for engaging the paper and transferring it to the printing mechanism of the press, said device comprising a reciprocating frame provided with means for engaging the paper and having two parallel arms, and means for adjusting the degree of reciprocation of the frame for positioning the paper properly with respect to the platen, fixed bearings for said arms, racks on said arms, and said adjusting means comprising stops adjustable along the length of said arms and adapted to strike and be stopped by said bearings, in coöperation with a train of driving connections operating on said racks, and consisting of two pinions meshing with said racks, a shaft to which such pinions are secured, a third pinion on said shaft, a second rack meshing with said third pinion, a driving crank, and a connecting rod between said crank and second rack, said connection comprising two members one connected with the crank and the other with the second rack, said members being adjustable one upon the other to vary the length of the driving connection.

51. In a printing press, the combination of a transfer device for engaging the paper and transferring it to the printing mechanism of the press, said device comprising a reciprocating frame provided with means for engaging the paper and having two parallel arms, and means for adjusting the degree of reciprocation of the frame for positioning the paper properly with respect to

58. A feeding attachment for printing presses, comprising, in combination, a platen, a carrier movable across the face of said platen and provided at opposite sides with
 5 a pair of rack bars, means on said carrier for gripping a sheet of paper delivered thereto, a pair of gears meshing with said racks, a shaft whereon said gears are mounted, an endwise movable reciprocatory mem-
 10 ber for oscillating said shaft, means for reciprocating said member, a feed carrier adapted to deliver the sheet to the first named carrier, and a delivery carrier for removing said sheet from said first-named car-
 15 rier to a point remote therefrom.

59. A feeding attachment for printing presses, comprising, in combination, a platen, a carrier movable across the face of said platen and provided at opposite sides with
 20 a pair of rack bars, means on said carrier for gripping a sheet of paper delivered thereto, a pair of gears meshing with said racks, a shaft whereon said gears are mounted, a third gear mounted on said shaft, an end-
 25 wise movable rack bar engaged with said third gear for oscillating said shaft, means for reciprocating said last-named rack bar, means for varying the extent of movement

of said rack bar to regulate that of said carrier, a feed carrier adapted to deliver the
 30 sheet to the first-named carrier, and a delivery carrier for removing said sheet from said first-named carrier to a point remote therefrom.

60. A feeding attachment for printing
 35 presses, comprising, in combination, a platen, a carrier movable across the face of said platen, and provided at opposite sides with a pair of rack bars, means on said carrier for gripping a sheet of paper delivered thereto,
 40 a pair of gears meshing with said racks, a shaft whereon said gears are mounted, a third gear mounted on said shaft, an endwise movable rack bar engaged with said third gear for oscillating said shaft, a second
 45 shaft, means for oscillating same, a crank arm secured to the second shaft and connected to the last-named rack bar, means for feeding a sheet of paper to the first-named carrier, and means for delivering said sheet
 50 from said first-named carrier to a point remote therefrom.

KARL F. KIRKMAN.

Witnesses:

S. E. HIBBEN,
 LOUIS B. ERWIN.