G. A. FRIESS.

SHEET DELIVERY MECHANISM FOR PRINTING PRESSES.

APPLICATION FILED APR. 4, 1916.

1,280,702.

Patented Oct. 8, 1918.

4 SHEETS—SHEET 1.

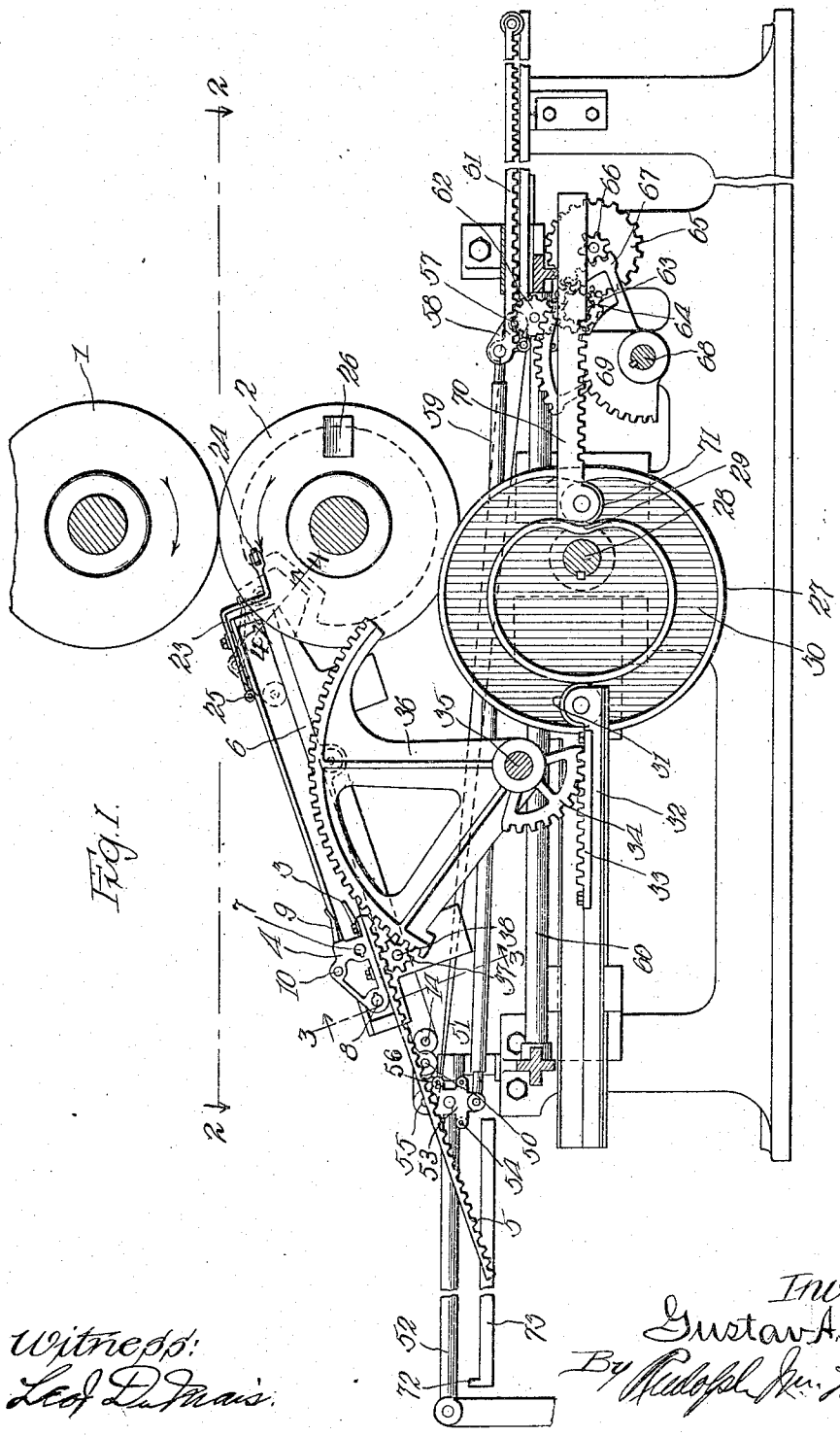


Fig. 1.

Witness:
Leo J. DeMais.

Inventor:
Gustav A. Friess
By Rudolph Ins. Atty.

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

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4 SHEETS—SHEET 2.

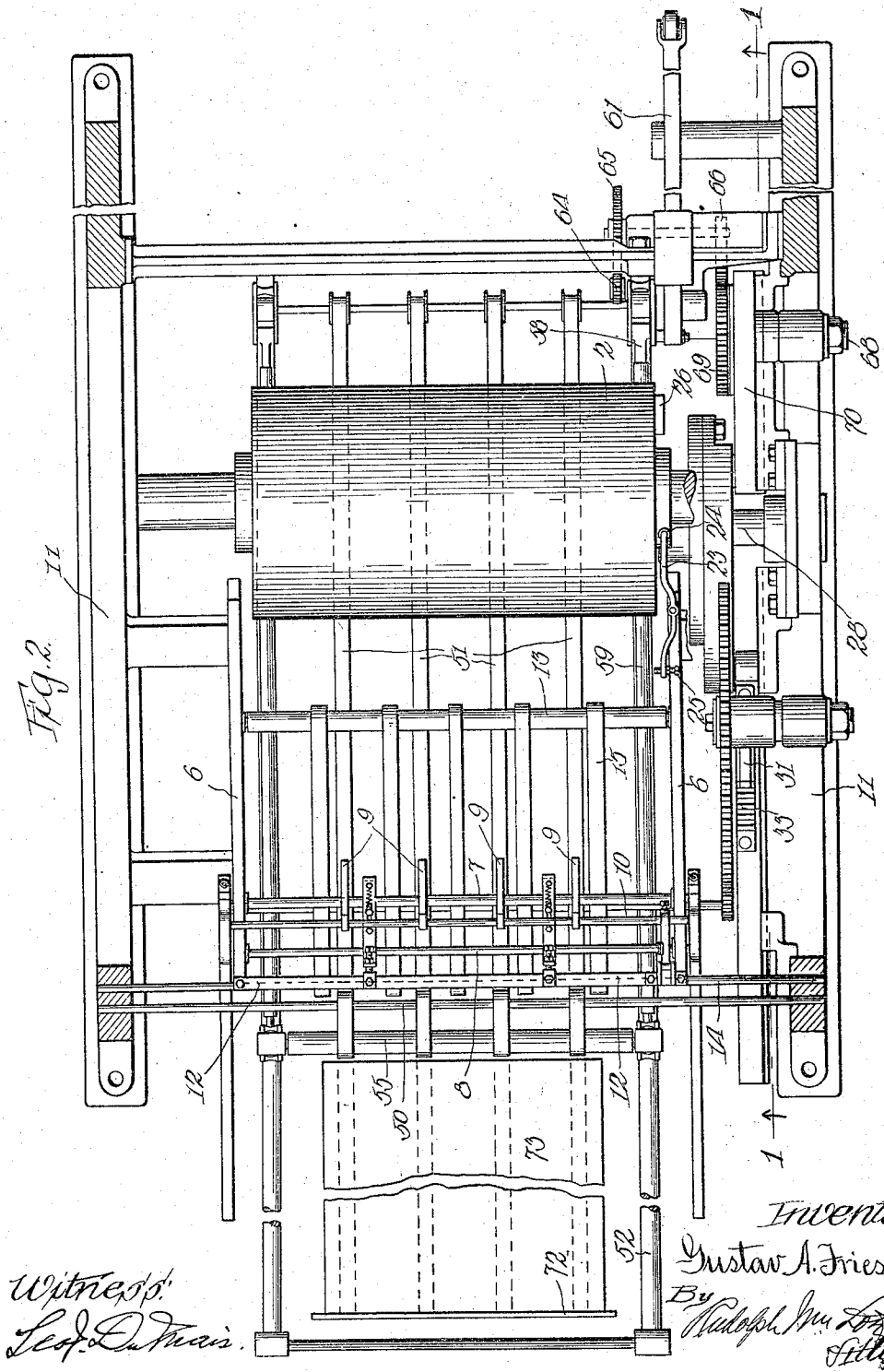


Fig. 2.

Witnesses:
Leo. L. DuMais.

Inventor.
Gustav A. Friess
By Rudolph Ivy Lee
Atty.

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4 SHEETS—SHEET 3.

Fig. 3.

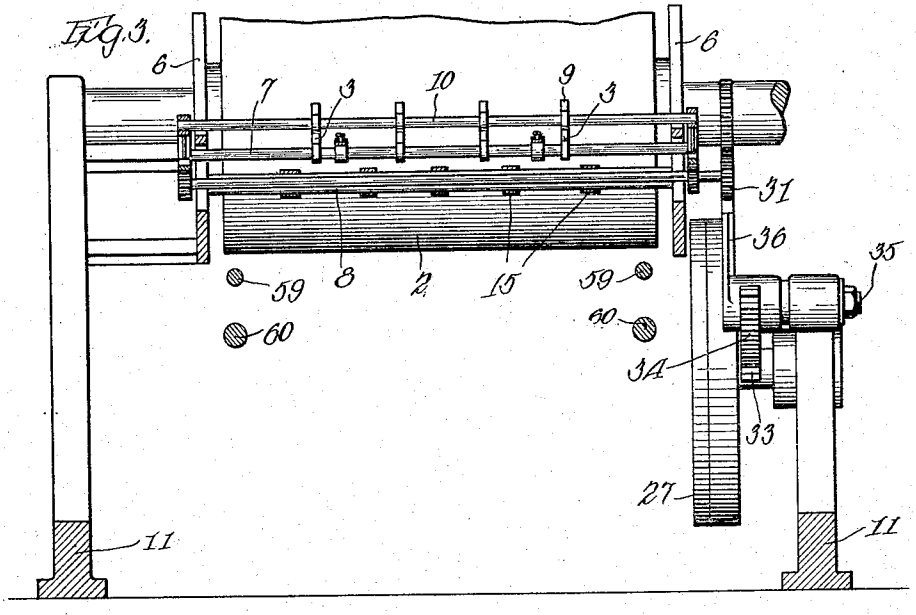


Fig. 4.

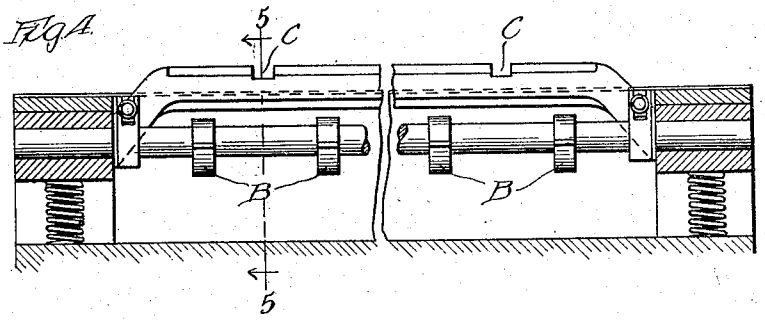


Fig. 10.

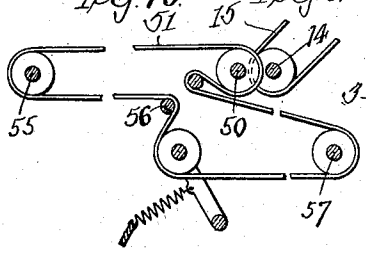
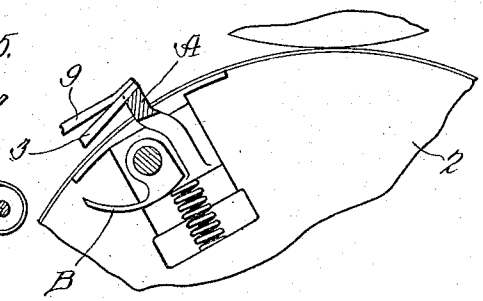


Fig. 5.



Witnesses:
Leo. J. Dubois.

Inventor:
Gustav A. Friess
By Rudolph Ivers & Stdg.

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G. A. FRIESS.

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4 SHEETS—SHEET 4.

Fig. 6.

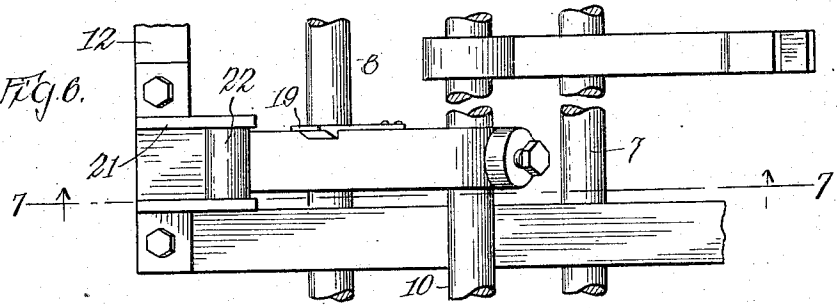


Fig. 7.

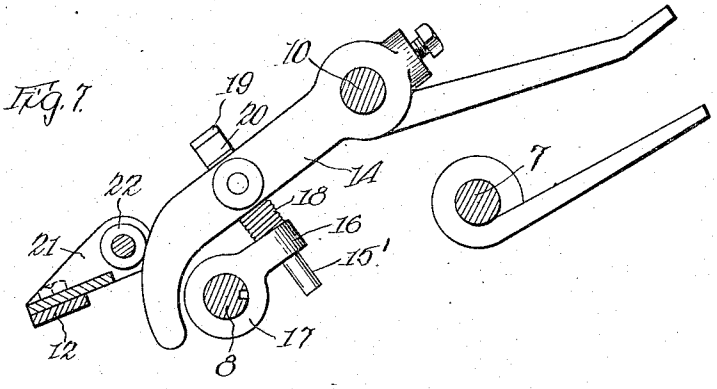


Fig. 8.

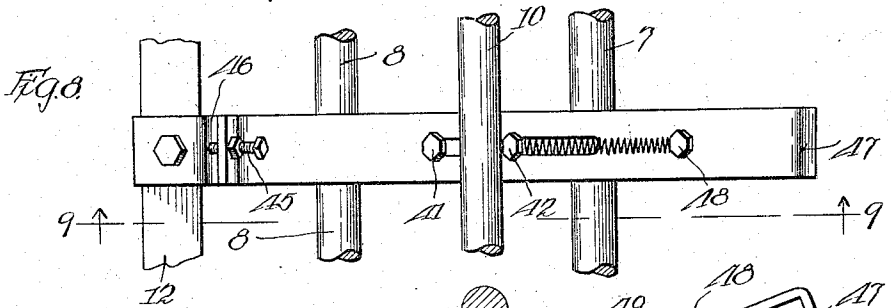
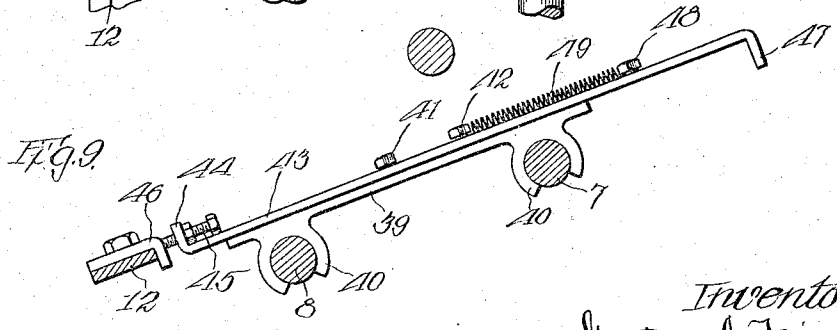


Fig. 9.



Witnesses:

Leo. J. DuMais

Inventor:

Gustav A. Friess

By Rudolph Ivan Lee Atty.

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

UNITED STATES PATENT OFFICE.

GUSTAV A. FRIESS, OF CHICAGO, ILLINOIS.

SHEET-DELIVERY MECHANISM FOR PRINTING-PRESSES.

1,280,702. Specification of Letters Patent. Patented Oct. 8, 1918.

Application filed April 4, 1916. Serial No. 88,822.

To all whom it may concern:

Be it known that I, GUSTAV A. FRIESS, subject of the Emperor of Germany, residing at Chicago, 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 do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in sheet delivery mechanism for printing presses, and more particularly to sheet delivery mechanism for so-called cylinder presses in which the sheet passes between companion printing cylinders.

The particular objects of the present invention are:

To provide sheet delivery mechanism which is constructed and arranged to positively engage the edge portion of each sheet as the latter is released by the sheet-gripping mechanism of the printing elements, and will draw said sheet at the same speed at which it would be delivered from between the companion printing elements by the frictional engagement of the sheet between the opposed surfaces of the latter, thus effecting the proper requisite movement of the sheet entirely independently of the frictional engagement thereof and by delivery thereof from between said printing elements.

A further object of the invention is to provide sheet-delivery mechanism which will operate primarily to positively insure delivery of sheets from between the printing elements, and will deliver the same upon sheet delivery means adapted to effect deposit of the sheets accurately upon a given surface.

A further object of the invention is to provide sheet-delivery means adapted to deposit sheets so that one edge thereof will first contact with the stack and the balance of the sheet follow, whereby the formation of an air cushion below the sheet is prevented and its accurate deposit by gravity assured.

Other objects of the invention will appear from the following specification.

The invention consists in the features of construction and combinations of parts hereinafter fully described and particularly claimed.

In the accompanying drawings illustrating the invention:

Figure —1— is a vertical longitudinal sectional view of portions of a printing press and sheet delivery mechanism therefor constructed in accordance with my invention, taken on the line 1—1 of Fig. —2—.

Fig. —2— is a top plan view of the same partly in section on the line 2—2 of Fig. —1—.

Fig. —3— is a transverse section of the same on the line 3—3 of Fig. —1—.

Fig. —4— is a detail transverse section on the line 4—4 of Fig. —1—.

Fig. —5— is a detail section on the line 5—5 of Fig. —4— showing the sheet-grippers of the delivery mechanism in engaging relation to the sheet as the latter is released by the sheet-gripping mechanism of the pressure cylinder.

Fig. —6— is a fragmentary detail plan view on an enlarged scale of a portion of a carrier constituting a part of the mechanism.

Fig. —7— is a fragmentary detail vertical section of the same on the line 7—7 of Fig. —6—.

Fig. —8— is a fragmentary detail plan view showing a stripper constituting a part of a carrier of the mechanism.

Fig. —9— is a fragmentary detail vertical section of the same on the line 9—9 of Fig. —8—.

Fig. —10— is a fragmentary detail vertical longitudinal section illustrating the arrangement of a movable carrier belt employed.

My present invention is particularly designed and adapted for use on printing presses of the type known as rotogravure presses, examples of which are illustrated and described in my copending applications Ser. Nos. 88,823, 88,833 and 77,839, and more particularly in connection with cylinder printing presses in which the pressure cylinder is equipped with sheet-gripping mechanism constructed in accordance with the invention described and claimed in my aforesaid copending application Ser. No. 77,839.

My present invention includes a reciprocable carriage equipped with sheet-gripping mechanism, which is actuated to position said sheet-gripping mechanism in engaging

relation to the sheets to grip the latter at the precise moment that the sheet is released by the sheet-gripping mechanism of said pressure cylinder. The said carriage is further timed in speed of reciprocable movement to accord with the surface speed of the cylinders of the press so that upon gripping each sheet the latter will be maintained taut between the edge portion thereof engaged with the carrier, and that portion which is disposed between and in engagement with the cylinder surfaces, thereby preventing the sheet adhering to the surface of either cylinder and becoming smudged or blurred by a movement relatively to the inked surface with which it might remain in contact.

In the accompanying drawings I have shown only so much of the present frame and mechanism as is necessary to a proper illustration of the present mechanism. Thus, for example, I have shown the printing cylinder 1 and pressure or tympan cylinder 2 in the relative positions in which they are disposed in the press without illustrating the portions of the press frame upon which said cylinders are supported nor the gearing for rotating said cylinders. The feed table for feeding sheets is also omitted from illustration for obvious reasons.

The pressure or tympan cylinder 2 of the press is equipped with the radially reciprocable sheet gripper mechanism illustrated and described in my aforesaid copending application Ser. No. 77839. This mechanism is, as fully disclosed in said copending application, arranged to release the edges of the sheets substantially at the moment that said gripping mechanism passes the plane or line of opposed surface portions of the cylinders 1 and 2 between which the sheet is engaged in printing the same. At this time the anvil member A of this sheet-gripping mechanism of the cylinder is disposed at the outer limit of its movement. Between the several companion clamping members B of this gripper the said anvil member is provided with recesses C adapted to receive the outer ends 3 of rigid members of the sheet-gripping mechanism of the carriage 4. The latter consists of two side members each carried by a rack-bar 5 suitably mounted to move longitudinally in inclined guides 6 provided therefor on the press frame. The said side members of the carriage are rigidly connected with each other by means of two cross-bars 7 and 8. The rigid members 3 of the sheet-gripping means are suitably secured to the said cross-bar 7 while the companion movable or clamping members 9 of said sheet grippers are mounted on a rock-shaft 10 journaled in bearings in the upper ends of said side members 4 of the carriage. The frame 6, upon which the said carriage is reciprocably movable, consists of two parallel side rails suitably supported upon the side members 11 of the press frame, and which are connected with each other at their lower ends by means of a cross-bar 12. Journaled in bearings in said side members 6 of said frame between the ends of the same is a shaft 13 over which, and a companion shaft 14 contiguous to the lower end of said frame 6, a plurality of belts 15 are trained.

Rigidly mounted on the shaft 10, contiguous to one end thereof, is an arm 14 extending in the opposite direction from the sheet-gripping members 9, the outer or free end of said arm 14 being curved. Pivotally secured to the latter between its ends is a plunger 15′ which is reciprocably movable in an opening in the outer end of a projection 16 of a collar 17 mounted on the cross-bar 8. A helical compression spring 18 is interposed between the opposed surfaces of the arm 14 and projection 16, and serves to maintain said arm 14 normally at the upper limit of its movement, and the gripper members 9 in contact with the gripper members 3.

Secured to one side of the projection 16 is a flat spring 19 which is provided contiguous to its outer end with a projection 20 having a lower surface extending perpendicularly to the body portion of the spring, and having an inclined surface which is adapted to be engaged by the arm 14 as said arm is moved from the upper to the lower limit of its movement, whereby to force said spring back and cause said projection 20 to spring into the path of the upper surface of said arm 14 as the latter attains the position shown in Fig. —7— for the purpose of holding it in that position during the upward stroke of the carriage 4. Mounted on the cross-bar 12 is a bifurcated projection 21 carrying an antifriction roller 22 which is disposed in the path of the curved end portion of the arm 14 and is engaged by the latter as the carriage 4 approaches the lower limit of its movement thus turning the said arm 14 and the shaft 10 against the action of the spring 18 to the position shown in Fig. —7—.

Pivotally mounted between its ends upon a side rail 6 of the frame in which said carriage is reciprocably movable, is a lever 23 equipped at one end with an anti-friction roller 24, and at its other end with a set-screw 25. Mounted on one end of the cylinder 2 is a cam projection 26 in the path of which the anti-friction roller is disposed, the latter being adapted to be forced by said projection 26 outwardly from the end of the cylinder 2 thereby effecting a movement of the set-screw 25 in the opposite direction. The reciprocable movement of the carriage 4 is so timed relatively to the rotation of the cylinder 2 as to cause the outer end portion

of the spring 19 to become disposed in the path of the set screw 25 at the moment that the gripper members 3 become disposed in the recesses of the anvil member of the sheet-gripping devices carried by the cylinder 2, thus throwing said projection 20 out of the path of the arm 14 and permitting the latter to be moved by the spring 18 to effect a gripping of the sheet between the members 3, and the companion members 9, carried by the shaft 10. The said set-screw 25 is disposed at a sufficient elevation above the arm 14 to be out of the path of movement of the latter as the same is tripped.

Reciprocation of the carriage is effected from a cam 27 mounted on a shaft 28 journaled in bearings in the press frame and carrying the gearing for effecting rotation of the cylinder 2. The said cam 27 is what is usually termed an "eccentric cam" having a groove which is eccentric to the axis of rotation thereof and which, in the instance illustrated, is what is technically known as slightly "heart-shaped," that is to say, a portion 29 of the cam groove 30 is deflected inwardly to more nearly approach the axis of rotation than the immediately contiguous portions of said groove. Engaging in the groove 30 of said cam is an anti-friction roller 31 mounted upon one end of a reciprocable bar or plunger 32 longitudinally movable in a suitable guide on the press-frame. This plunger 32 carries a rack-bar 33 which meshes with a segmental gear 34 rigid with a rock shaft 35 journaled in bearings in one of the side members of the press frame. Rigid with said shaft 35 is a segmental gear 36 of greater radius which meshes with a spur pinion 27 on a shaft 38 journaled in bearings in the side members 6 of the carriage-supporting frame. The said shaft 38 carries similar pinions which mesh with the rack bars 5, thus reciprocating said rack-bars, and the carriage 4 in accordance with the opposite rocking movements of the segmental gear 36.

It will be noted that, as shown in Fig. —1—, upon a rotation of the cam 27 the plunger 32 and rack 33 will be moved toward the shaft 28, and this will move the carriage 4 to the upper limit of its movement. As the anti-friction roller 31 engages in the portion 29 of the cam-groove the said carriage will be momentarily at rest, and it is in this interval of rest that the sheet is gripped between the gripper members 3 and 9, and in which it is released by the sheet-gripping members of the cylinder 2. Immediately following the release and gripping of the sheet—respectively, the carriage 4 will begin its reverse movement, thus pulling the sheet from between the cylinders 1 and 2 and maintaining the same taut without, however, hastening its delivery, the movement of the carriage being timed to accord exactly in speed with the surface speed of the cylinders 1 and 2 as aforesaid.

The sheet will be maintained engaged between the grippers 3 and 9 until the carriage approaches the lower limit of its movement and the gripper members 9 are raised by the engagement of the arms 14 of the shaft 10 with the anti-friction roller 22. The sheet is thus released from engagement by the grippers, but the latter continue their rearward movement following the primary opening movement of the grippers to release the sheet. Mounted on the cross-bars 7 and 8 is a member 39 equipped with two collars 40 engaging said cross-bars. Mounted in said member 40 are two set-screws 41 and 42, the shanks of which pass through a longitudinal slot in a reciprocable stripper 43. The latter is equipped at one end with a flange 44 in which is a set-screw 45 adapted to engage an angle plate 46 mounted on the cross-bar 13 in the path of said set-screw. The other end of said member 43 is provided with a flange 47 which is adapted to abut against the gripped edge of the sheet. Mounted in said member 43 is a set-screw 48 with which one end of a helical tension spring 49 is engaged, the latter being engaged at its other end with the set-screw 42, and being adapted to hold said stripper 43 normally at the lower limit of its movement. As the carriage 4 approaches the lower limit of its movement the set-screws 45 of the strippers 43 engage the plates 46 disposed in their path, thus causing a forward movement of said strippers 43 relatively to the carriage thus preventing the sheet from following the movement of the carriage through its entire stroke. The sheet is thus thrown free of the gripper members 3, and will drop upon the belts 15 which are maintained constantly in motion to effect continued movement of the sheet deposited thereon in the same direction as the same is carried by the carriage 4.

Contiguous to and parallel with the shaft 14 over which the belts 15 are trained is a shaft 50 over which belts 51 are trained, the latter being also trained over other rollers, as I will now describe.

Mounted on the press frame are two parallel guide rods 52, constituting rails for the side members of a carriage 53, said side members being suitably connected together by means of the cross-rods 54. Journaled at its ends in the upper ends of the side members of the said carriage 53 is a shaft 55 over which said belts 51 are also trained. The said carriage 53 is adapted to be reciprocated thus effecting a reciprocable movement of the shaft 55 relatively to the shaft 50. Contiguous to said shaft 50 and disposed between the same and the carriage

53 is an idle shaft 56 over which said belts 51 are trained, said belts being further trained over a shaft 57, journaled in bearings of another carriage 58 at the other side of the shaft 28, and which is connected with the carriage 53 by means of the connecting rods 59.

The said carriage 58 is reciprocable on the guide rods 60 mounted on the press-frame, and is rigid with rack-bars 61. The latter mesh with a spur gear 62 mounted on a stud-shaft carried by the press-frame, and this in turn meshes with a spur gear 63 on a similar shaft also carrying a spur pinion 64. The latter meshes with a spur gear 65 rigid with which is a spur pinion 66. The latter meshes with a segmental spur gear 67 rigidly mounted on a rock shaft 68 keyed to a segmental spur gear 69 meshing with a reciprocable rack 70 mounted in guides in the press frame, and which is equipped with an anti-friction roller 71 engaged in the groove 30 of the cam 27 at a point diametrically opposite from the engagement of the anti-friction roller 31 therein. The shaft 50 or the companion shaft contiguous thereto over which the said belt 51 is trained is geared to constantly rotate to cause the belts 51 to travel continuously at a given speed. It will be seen that, as the carriage 4 moves toward the upper limit of its movement, the carriages 53 and 58 will move in the opposite direction, and at a speed greater than the speed of movement of the carriage 4 in order to cover a greater length of travel during the same interval of time. The speed of travel of the belts 51 is preferably equal to the speed of travel of the carriages 53 and 58, and the direction of travel of said belts 51 is such that the sheet supporting surfaces of the same tend to move the sheet toward the flange 72 at the end of the sheet-receiving platform 73 upon which the sheets are adapted and intended to be deposited. Thus, as the sheets are delivered upon the belts 15, they will be carried by the latter to the belts 51 and at substantially that moment that the lower edge of each sheet contacts with said belt, the shaft 55 will begin its movement toward the flange 72. Inasmuch as the speed of travel of the belts 51 is equal to the speed of travel in said direction of said carriage 53, the sheet delivered upon the belts 51 will remain practically stationary with relation to the shaft 55 during the said movement of the latter, but on beginning its rear movement it will be obvious that the belts 51 will maintain the same speed and thus the supporting surfaces for the sheet will be withdrawn from underneath the same, and said sheet will be gradually deposited upon the stack supported upon said plate 73, and such deposit will be made by the forward end of the sheet first coming in contact with the supporting surface thereof and the remainder of the sheet will gradually follow the same, thus preventing the formation of an air cushion underneath the sheet whereby the latter may become displaced. Obviously stripper mechanism may be associated with the shaft 55 and belts 51 to further insure a proper positioning of successive sheets on the stack, but I have found such stripper mechanism to be superfluous.

The operation of my said sheet-delivery mechanism will be fully understood from the foregoing description. While I have shown the preferred embodiment of the invention, it will be understood, of course, that the same may be changed and varied in certain details of construction without departing from the invention as defined in the appended claims.

I claim as my invention:—

1. Sheet-delivery mechanism for printing presses including a reciprocable carrier equipped with sheet-gripping means, comprising a member fixed to said carriage and a co-acting movable member, means external of said carrier for effecting opening and closure of said sheet-gripping means, a part of said means disposed on a printing element of the press, sheet-stripping means on said carrier associated with the said gripping means for throwing sheets out of engaging relation to the latter as they are released, and a carrier for receiving the sheets.

2. Sheet-delivery mechanism for printing presses including a continuously traveling carrier belt, a pair of shafts journaled in bearings in the press frame and over which a second belt is trained, one of said shafts being driven, a reciprocable carriage carrying a pair of idle-shafts over which said second belt is trained, and gearing for reciprocating said carriage at substantially the speed of travel of said second belt, whereby a sheet deposited on said belt will be carried forward without appreciable movement relative to said carriage as the latter moves in one direction and the second belt will be withdrawn from beneath said sheet as said carriage moves in the opposite direction, mechanism interposed between said carrier and the printing mechanism of the press for delivering sheets upon said carrier, and gearing between said carriage and said mechanism of the press for effecting synchronous movement of said parts.

3. Sheet-delivery mechanism for printing presses including a continuously traveling carrier belt, a pair of shafts journaled in bearings in the press frame and over which a second belt is trained, one of said shafts being driven, a reciprocable carriage carrying a pair of idle-shafts over which said second belt is trained, and gearing for reciprocating said carriage at substantially the

speed of travel of said second belt, whereby a sheet deposited on said belt will be carried forward without appreciable movement relative to said carriage as the latter moves in one direction and the second belt will be withdrawn from beneath said sheet as said carriage moves in the opposite direction, and a reciprocable sheet carrier associated with said belt and carriage and the printing mechanism of the press for transferring sheets from the latter to the former.

4. Sheet-delivery mechanism for printing presses including a continuously traveling carrier belt, a pair of shafts journaled in bearings in the press frame and over which a second belt is trained, one of said shafts being driven, a reciprocable carriage carrying a pair of idle-shafts over which said second belt is trained, and gearing for reciprocating said carriage at substantially the speed of travel of said second belt, whereby a sheet deposited on said belt will be carried forward without appreciable movement relative to said carriage as the latter moves in one direction and the second belt will be withdrawn from beneath said sheet as said carriage moves in the opposite direction, a reciprocable sheet carrier associated with said belt and carriage and the printing mechanism of the press for transferring sheets from the latter to the former, and a carrier belt interposed between said reciprocable carrier and said carriage adapted to receive sheets from the former and deliver the same upon the belt trained over the idle-shafts of the latter.

In testimony whereof I have signed my name in presence of two subscribing witnesses.

GUSTAV A. FRIESS.

Witnesses:
M. M. BOYLE,
IRVING COWLES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."