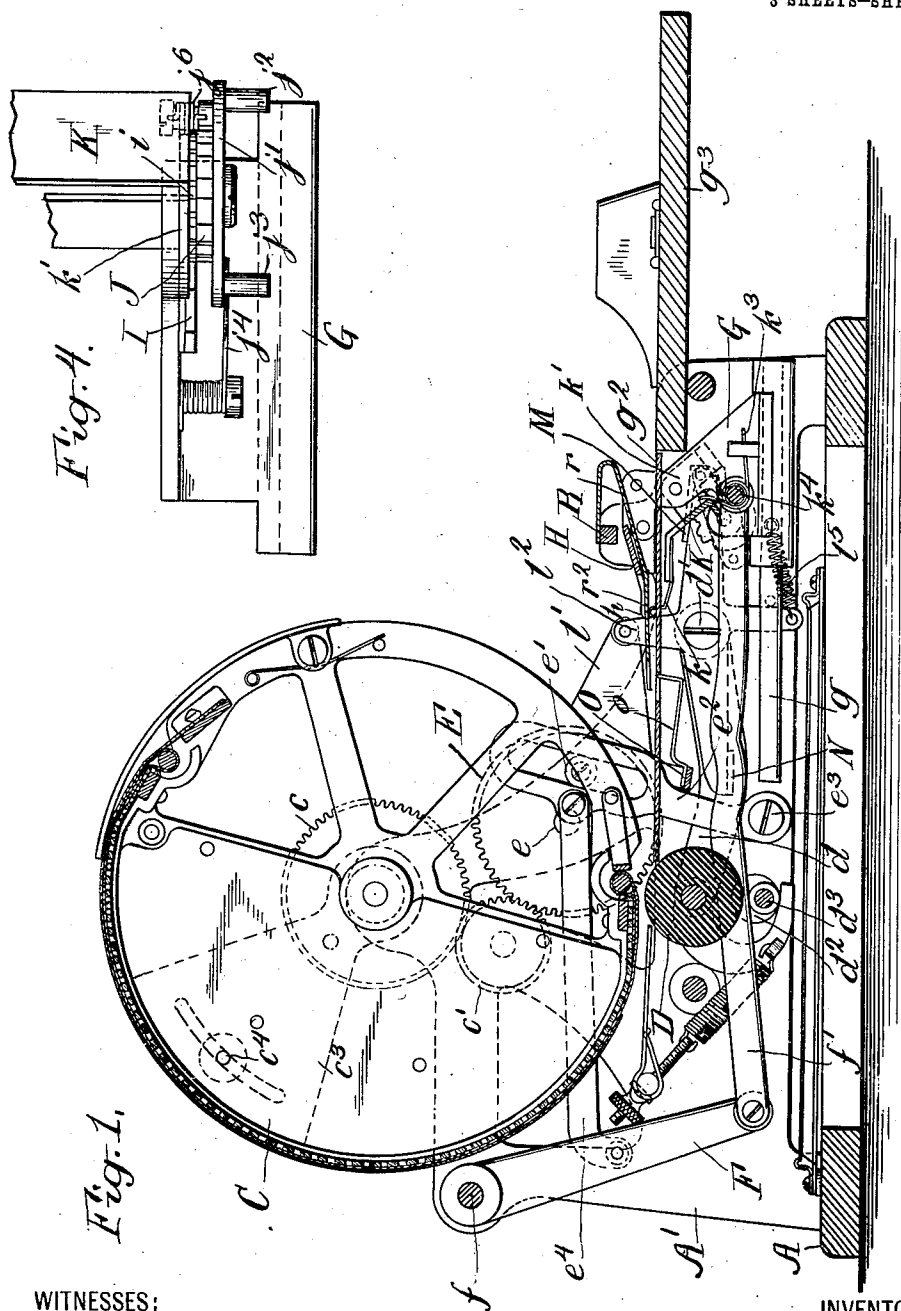


A. B. DICK.
SHEET FEEDING APPARATUS.
APPLICATION FILED APR. 6, 1908.

977,283.

Patented Nov. 29, 1910.

3 SHEETS—SHEET 1.



WITNESSES:

J. Edwards
J. Bartlett

INVENTOR

Albert B. Dick

BY

J. O. Edwards
ATTORNEY

977,283.

3 SHEETS—SHEET 2.



INVENTOR

Fig. 2

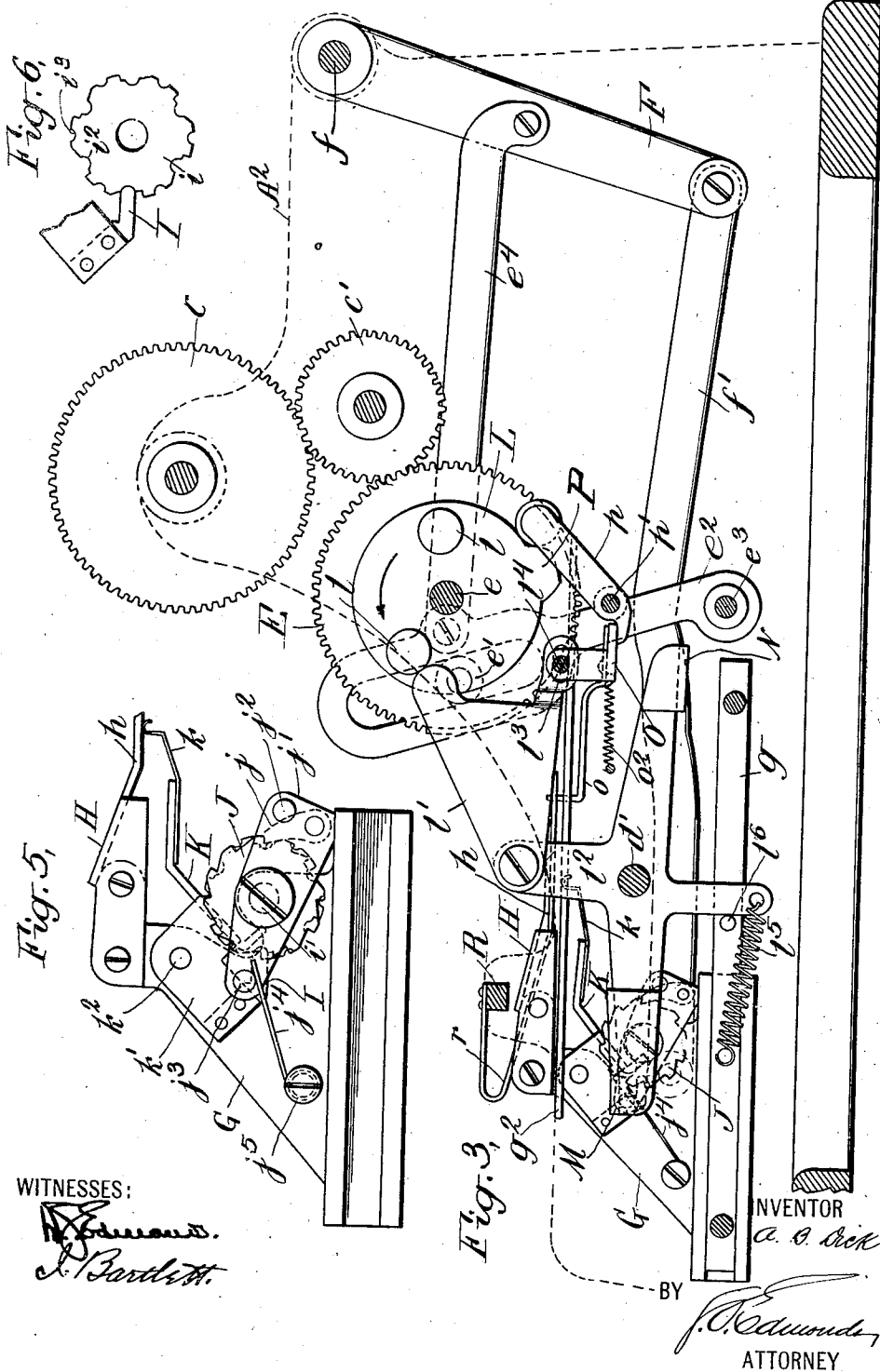
Albert B. Dick

BY

BY *J. P. Edwards*
ATTORNEY

A. B. DICK.
SHEET FEEDING APPARATUS.
APPLICATION FILED APR. 6, 1908.

3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

ALBERT B. DICK, OF LAKE FOREST, ILLINOIS, ASSIGNOR TO A. B. DICK COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

SHEET-FEEDING APPARATUS.

977,283.

Specification of Letters Patent.

Patented Nov. 29, 1910.

Application filed April 6, 1908. Serial No. 425,407.

To all whom it may concern:

Be it known that I, ALBERT B. DICK, a citizen of the United States, residing at Lake Forest, in the county of Lake and State of Illinois, have invented a certain new and useful Improvement in Sheet-Feeding Apparatus, of which the following is a specification.

This invention relates to apparatus for feeding sheets of paper or other material successively to any suitable device such as a printing or folding machine and particularly to a stencil-duplicating machine.

The object of the invention is to provide an improved form of sheet-feeding apparatus which is simple in construction and reliable and efficient in operation, in which provision is made for an adjustment whereby the impressions or folds may be received by the sheets in the desired positions, with which the feed of sheets at other than the proper times is precluded, with which accurate registration may be obtained, and which may be operated at high speed.

The invention involves the use of one or more grippers, each having the jaws thereof located one above and the other below the path of movement of the sheets, mechanism for operating these grippers to cause them to grasp the sheets of paper and release the same successively, and mechanism for reciprocating the grippers to move them forward when they have grasped a sheet and return them to initial position after they have released the sheet. With these grippers, one or more stops are combined to arrest the movement of a sheet in the position for proper coaction with the grippers. Preferably, means are provided for moving these stops so as to carry them out of the path of movement of a sheet just as the latter is grasped by the grippers, but as soon as the sheet has been moved by the grippers to such position that the stops cannot arrest its movement, the latter are allowed to return to their initial position so that another sheet may be fed forward as soon as is desired and will be arrested in proper position by the stops.

The preferred embodiment of my invention is illustrated in the accompanying drawings in which—

Figure 1 is a central section of the machine on line 1—1, of Fig. 2, Fig. 2 is a top view of a portion of the machine broken

away and sectioned in part, the stencil-carrying drum being removed, Fig. 3 is a sectional detail view on line 3—3 of Fig. 2, Figs. 4, 5 and 6 are detail views hereinafter referred to, and Figs. 7, 8 and 9 are detail views of the sheet-grippers and stops showing three positions thereof.

Referring to these drawings, the machine consists of a base A on which are mounted side-frames A' A². The stencil-carrying drum C is mounted for rotation in bearings formed in these side-frames and has a gear c adapted to be fixed to one end thereof and meshing with a pinion c' secured on a stub-shaft mounted for rotation in the side frame A' and carrying an operating handle c². The gear c is loose on the stub-shaft at one end of the stencil carrying drum C and is secured to a sector-shaped piece c³ provided with an arc-shaped slot through which a screw c⁴ extends, the end of this screw entering a threaded opening in one of the end pieces of drum C; by means of screw c⁴, gear c may be secured to the drum C in any desired position, in order to obtain the desired relation of the drum C and the stencil secured thereon, to the other parts driven by gear c. The drum C is provided with the usual foraminated cylindrical surface over which an inking pad and a stencil sheet may be secured, and coacting with this drum is a pressure roller D mounted for rotation below the drum in arms d loosely mounted on studs d' extending inwardly from the side frames A', A². The ends of the arms d are curved downwardly as shown in Fig. 1 to coact with cams d² mounted upon a shaft d³ which is provided with a suitable operating handle whereby the arms d may be turned about the studs d' to carry the pressure roller D to an inoperative position with respect to the stencil carrying drum. The gear c' also meshes with the gear E mounted for rotation on a stud e extending inwardly from the side frame A'. On the inner face of this gear is an eccentric pin e' which enters a slot in a lever e² pivotally mounted at e³ on the side frame A'. Lever e³ is connected by a link e⁴ with an arm F secured to and depending from a shaft f which is mounted for rotation in bearings formed in the side frames of the machine. At the other side of the machine, shaft f carries an arm F' similar to arm F. The lower ends of the arms F, F' are connected by links f' with gripper carriers G,

G'. The carriers G, G' are each provided with a groove to receive a bar *g* secured upon the side frame of the machine and disposed in a horizontal position. The upper ends of the carriers G, G' project through slots *g'* (Fig. 2) in a metallic plate *g*² which forms part of the feed-board of the machine, the other part being of wood as indicated at *g*³ in Fig. 1, and these two parts being supported upon the side frames of the machine with their upper surfaces in the same plane. The upper ends of the carriers G, G' are connected by a strip H lying above the feed-board *g*², this plate having a plurality of integral fingers *h* projecting from one edge thereof, and the ends of these fingers being a short distance above the upper surface of the feed-board. The fingers *h* constitute the upper gripper jaws; the lower gripper-jaws are shown at *k* and consist of strips of sheet metal having curled ends as shown secured to fingers integral with and projecting from a strip K. The ends of this strip are turned at a right angle to the body-portion thereof to form the end pieces *k'* and these end pieces are pivotally mounted at *k*² upon the gripper carriers G, G'. Springs *k*³ are coiled about a rod *k*⁴ extending between the gripper carriers G, G' and each of these springs has one end affixed to the gripper carrier and the other end bearing upon the strip K so that the springs *k*³ tend to turn strip K about the pivots *k*² in a direction to carry the upper ends of the lower gripper-jaws upwardly through slots *k*⁵ (Fig. 2) in plate *g*² into contact with the ends of the upper gripper-jaws *h*.

The turning movement of the strip K carrying the lower gripper-jaws about the pivots *k*² under the tension of springs *k*³ is limited by a stop I secured upon the end piece *k'* of the strip K at one side of the machine. The end of this finger is adapted to enter depressions in the periphery of a stop-wheel *i* mounted for rotation upon a stub-shaft *i'* on the gripper carrier G. The stop-wheel *i* is preferably shaped as indicated in Fig. 6, that is, in its periphery are a plurality of depressions *i*² of equal depth, and alternating with these are a plurality of depressions *i*³ of a less depth. When the end of stop I enters one of the depressions of greater depth, the ends of the lower gripper-jaws *k* are in the upper position in contact with the ends of the upper gripper-jaws *h*, but when the end of stop I is in one of the shallower depressions the ends of the lower gripper-jaws *k* are held out of contact with the upper gripper-jaws *h* since when stop I enters one of the shallower depressions the turning movement of strip K about pivots *k*² under the tension of springs *k*³ is arrested when the ends of the lower gripper-jaws are below or flush with the upper surface of the feed-board as shown in Fig. 3. Secured to

the stop-wheel *i* is a ratchet wheel J having a number of teeth equal to the total number of depressions in the periphery of the stop-wheel. With this ratchet wheel, a pawl *j* coacts, this pawl being pivotally mounted upon a plate *j'* which is pivotally mounted upon the stub shaft carrying the ratchet wheel and the stop-wheel. Projecting from one face of the plate *j'* are two pins *j*² and *j*³, and a spring *j*⁴ coiled upon a stud *j*⁵ on the gripper carrier G has one end extending under the pin *j*³ so that this spring tends to turn the plate *j'* about its pivot in a direction to cause pawl *j* to slide back over the teeth of the ratchet J. The end of pawl *j* is held in engagement with the teeth of the ratchet wheel by a spring *j*⁶ (Fig. 4).

Secured to the inner face of the gear E is a disk L having two studs *l*, *l* projecting from one face thereof. These studs are adapted to engage and actuate a reciprocating plate *l'* which is pivotally connected to an actuating member *l*² shaped as shown in Fig. 3. In order to position the plate *l'* and guide it in its movement, the plate is provided with a horizontally disposed slot *l*³ through which extends a pin *l*⁴, this pin projecting inwardly from the side frame A'. The member *l*² is pivotally mounted upon the stud *d'* upon the side frame A' and a spring *l*⁵ is connected at one end to member *l*² and at the other to the side frame, so that this spring acts on member *l*² to turn it in a direction to carry the end of plate *l'* into the path of movement of studs *l*, *l*, excessive movement of member *l*² being precluded by a stop *l*⁶. On the end of one of the horizontally disposed arms of the member *l*² is a projection M adapted to engage the pin *j*³ when the gripper carriers are in the rearward position, and on the end of the other horizontally disposed arm of the member *l*² is a projection N adapted to engage the pin *j*² when the gripper carriers are in the forward position. Disk L is provided with a cam projection P adapted to coact with a roller on the end of an arm *p* pivoted upon a stud *p'* extending inwardly from the side frame A', and a projection on the lower end of arm *p* extends under a plate O pivotally suspended from the stud *l*⁴ and a similar stud at the other side of the machine. Secured to the plate O are a plurality of stops *o* the ends of which are upwardly turned and extend through openings *o'* (Fig. 2) in the feed-board *g*². A spring *o*² connected at one end to the plate O and at the other end to the side frame A' holds the stops *o* normally in operative position in which they are shown in Fig. 3. Extending between the side frames A', A² is a bar R on which a plurality of guides are secured, these guides being preferably shaped as shown in Fig. 1, so as to provide an inclined portion *r* and at the end of this a horizontally dis-

posed portion r^2 , and the ends of these guides being bifurcated and so disposed that the ends of the stops o underlie the spaces between the bifurcated portions of the guides.

5 In the operation of the machine a pile of impression sheets is placed upon the feed-board g^3 and the operator turns handle c^2 with one hand and passes the impression sheets successively forward over the surface

10 of the feed-board with the other. While the gripper-jaws are in the forward position and while they are returning to the rearward position they are separated since the lower gripper-jaws k are held in inoperative

15 position with their upper surfaces flush with or below the upper surface of the feed-board and the stops o are then in the upper or operative position. At this time the operator may pass a sheet forwardly over the

20 feed-board until its forward edge engages the stops o and its movement is arrested thereby. By turning the handle c^2 the gripper carriers are moved back by the arms F , F' and links f' to the rearward position and

25 as they reach this position one of the studs l engages the end of the plate l' and operates the latter to rock member l^2 against the tension of spring l^3 . When member l^2 is thus rocked the projection M thereon en-

30 gages the upper surface of pin j^3 and rocks plate j' so that the pawl j carried thereby operates the ratchet J and stop-wheel i . The extent of the movement of stop-wheel i when thus actuated, is sufficient to carry the

35 shallow depression i^3 therein in which the end of stop I rests, away from the end of the stop and to bring a deep depression i^2 under the end of the stop I , and when this occurs the springs k^3 turn the plate K and

40 the lower gripper-jaws k carried thereby about the pivots k^2 so that the lower grippers k are moved upwardly, engage the sheet and raise the latter a slight distance above the surface of the feed-board until it is

45 gripped between the lower gripper-jaws k and the upper gripper-jaws h . Just as this occurs the cam projection P rocks arm p about stud p' thus rocking the plate O about the pivots l^4 against the tension of the

50 spring o^2 until the ends of the stops o are below the surface of the feed-board. The gripper-jaws k and h then move forwardly, the carriers G , G' being actuated by the links f' and arms F , F' , and when moved

55 thus, the gripper-jaws carry the sheet along with them. Immediately after the forward edge of the sheet passes beyond the ends of the stops o the cam projection P allows the arm p , the strip O and the stops o to be returned substantially to their former posi-

60 tions by the spring o^2 ; this is permitted because of the fact that the upper gripper-jaws h move in the path a slight distance above the surface of the feed-board and the

65 lower gripper-jaws k hold the sheet up

against the under surface of the upper gripper-jaws h . The ends of the stops o may therefore project a short distance above the surface of the feed-board in contact with the under side of the sheet which is being fed

70 forward, the upper surface of the sheet being in contact with the ends of the guides r^2 . For this reason while the sheet which is being fed forward is passing over the stops

75 o , and in fact immediately after the forward edge of the sheet has passed beyond the ends of the stops, another sheet may be moved forward over the feed-board into position and such movement will be arrested

80 at the proper point by the stops o . The sheet grasped by the gripper-jaws h and k will be moved forwardly thereby until its forward edge is caught between the stencil-carrying drum and the pressure roller and

85 just as this occurs the other pin l will engage the end of plate l' and operate member l^2 as above described. In this movement of member l^2 , however, the projection N engages the under side of pin j^2 and plate j'

90 is again actuated so as to cause the ratchet J and stop-wheel i to move one step. This movement of the stop-wheel causes the transfer of the end of the stop I from one of the deep depressions in stop-wheel i to

95 one of the shallower depressions i^3 and the plate K is thus turned about the pivots k^2 and against the tension of the springs k^3 to carry the lower gripper-jaws k to inoperative position in which they are shown in Fig. 3.

100 The sheet is thus released by the grippers and its further movement is effected by the stencil-carrying drum and the pressure roller. The backward movement of the grippers then takes place and when in the

105 rearward position they are again operated in a similar manner, to grip the next sheet to be fed forward, this sheet being then in position with its edge in contact with stops o .

By means of the provision for adjustment

110 of the gear c relative to the stencil-carrying drum by screw c^4 the position of the stencil on the drum C with relation to the mechanism for actuating the grippers, may

115 be regulated as desired and in this way the position of the impression received by the sheets may be varied so that the impressions will bear the desired relation to the edges of the sheet. One end of the drum may be

120 provided with scale markings with which the edge of the sector-shaped member c^3 may coact to indicate the position which the impression received by a sheet will bear to the edges of the sheet.

A machine thus constructed may be oper-

125 ated at very high speed; in fact, its speed is limited only by the ability of the operator to feed the impression-sheets into position successively for proper coaction with the grippers. This may be done at higher speed

130

than has been possible with devices of this character heretofore provided for the reason that the stops which arrest the forward movement of a sheet are turned to operative position immediately after the forward edge of the preceding sheet has passed beyond them. If in operating the machine at high speed the operator does not get a sheet into position at the proper time the lower gripper-jaws *k* will be moved upwardly into contact with the upper gripper-jaws *h*, the passage of the edge of the sheet between the two sets of gripper-jaws and into contact with the stops will be thereby precluded and the grippers will start on their forward movement while the sheet remains at rest. In this case the operator should turn the operating handle backward a short distance until the member *l*² has been actuated so as to open the grippers. A further advantage present in a machine constructed as above described is that the feed of the sheets is quite uniform and therefore accurate registration of the impressions received by the sheets with matter previously printed thereon, is obtained.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:—

30 1. Sheet-feeding apparatus comprising the combination of a feed-board, a gripper-jaw mounted above the plane of the surface of the feed-board, a second gripper-jaw, means for moving the same toward said first-named gripper-jaw to raise a portion of the sheet between said jaws off said board and away from said gripper-jaw to release said sheet, and means for simultaneously reciprocating said gripper-jaws with the first gripper-jaw moving above and parallel to the plane of the surface of the feed-board, substantially as set forth.

2. The combination of a rotary printing member, means for rotating the same, a movable member coöperating with said member and forming therewith a printing couple, a feed-board having an opening therein, a gripper-jaw mounted above the surface of the feed-board, a second gripper-jaw, means for moving the same in said opening to carry its end toward said first-named gripper-jaw to raise a portion of the sheet between said jaws off said board and away from said jaw to release said sheet means for reciprocating said gripper-jaws in accordance with the rotation of said rotary member with the first gripper-jaw moving above and parallel to the surface of the feed-board, and means for effecting an adjustment of the time of operation of the gripper-jaws with respect to the rotation of said rotary member, substantially as set forth.

3. Sheet-feeding apparatus comprising the combination of a feed-board, an upper

gripper-jaw mounted above the plane of the surface of the feed-board, a lower gripper-jaw movable toward and away from the upper gripper-jaw, means for reciprocating the gripper-jaws with the upper gripper-jaw moving above and parallel to the plane of the surface of the feed-board, an upwardly extending stop, means for moving the stop downwardly to inoperative position below the plane of the feed-board, and means for returning the stop to operative position to arrest the movement of a sheet forwarded into coaction with the stop immediately after the forward edge of another sheet has been moved past the stop by said gripper-jaws, substantially as set forth.

4. Sheet-feeding apparatus comprising the combination of a rotary printing member, a feed-board, an upper gripper-jaw, lying above the plane of the feed-board, a lower gripper-jaw movable toward and away from the upper gripper-jaw, a single means for rotating said member and reciprocating said gripper-jaws with the upper gripper-jaw moving above and parallel to the plane of the surface of the feed-board, means for adjusting the time of the reciprocation of the gripper-jaws with respect to the rotation of said member, an upwardly extending stop, means for moving the stop downwardly to inoperative position below the plane of the feed-board, and means for returning the stop to operative position to arrest the movement of a sheet fed over said board into coaction with said stop immediately after the forward edge of another sheet has been moved past said stop by said gripper-jaws, substantially as set forth.

5. The combination of a rotary printing member, means for rotating the same, a movable member coöperating with said member and forming therewith a printing couple, a feed-board having an opening therein, a gripper-jaw mounted above the surface of the feed-board, a second gripper-jaw, means for moving the same in said opening to carry its end toward said first-named gripper-jaw to raise a portion of the sheet between said jaws off said board and away from said jaw to release said sheet, means for reciprocating said gripper-jaws in accordance with the rotation of said rotary member with the first gripper-jaw moving above and parallel to the surface of the feed-board, an upwardly extending stop for arresting a sheet in position for co-action with said gripper-jaws, and means for moving said stop downwardly to permit the sheet to pass it, substantially as set forth.

6. Sheet-feeding apparatus comprising the combination of a feed-board, two gripper-jaws mounted on opposite sides of the plane of the surface of the feed-board, means for moving said gripper-jaws relatively to cause them to grip and release a sheet, means

for moving said gripper-jaws forwardly to feed a sheet and rearwardly to return them to initial position, an upwardly extending paper-stop, means for moving the same downwardly to inoperative position to permit a sheet to be moved past the stop by said gripper-jaws, and means for returning the stop to operative position in contact with the under side of the sheet to arrest a second sheet in feeding position while the gripper-jaws are moving forwardly and immediately after the forward edge of the first sheet has passed the stop, substantially as set forth.

7. Sheet-feeding apparatus comprising the combination of a feed-board having two sets of openings therein, a set of gripper-jaws mounted above the feed-board, a set of gripper-jaws mounted below the feed-board with their ends projecting through the openings of one of said sets, means for moving said gripper-jaws relatively to cause them to grip and release a sheet, means for reciprocating said gripper-jaws with said upper gripper-jaws moving above and parallel to the surface of the feed-board, upwardly extending paper-stops projecting through the openings of the other of said sets, means for moving the stops downwardly to inoperative position to permit a sheet to be moved past the stops by said gripper-jaws, and means for returning the stops to operative position immediately after the forward edge of the sheet has passed the stops, substantially as set forth.

8. The combination of a rotary printing member, means for rotating the same, a movable member coöperating with said member and forming therewith a printing couple, gripper-jaws, means for reciprocating said jaws in correspondence with the rotation of said member, means for moving said jaws relatively in their reciprocating movement to cause them to grip a sheet, carry the sheet forward till its end projects between the members of the printing couple and then release the sheet, a paper-stop for arresting a sheet in feeding position, means for moving the paper-stop to inoperative position to permit the sheet to be moved past the stop by said gripper-jaws, and means for returning the stop to operative position in contact with the under side of the sheet to arrest a second sheet in feeding position immediately after the forward edge of the first sheet has passed the stop, substantially as set forth.

9. The combination of a rotary printing member, means for rotating the same, a movable member coöperating with said member and forming therewith a printing couple, a feed-board having an opening therein, a gripper-jaw mounted above the surface of the feed-board, a second gripper-jaw, means for moving the same in said opening to carry its end into and out of contact with said first-named gripper-jaw, means for reciprocating the gripper-jaws in accordance with

the rotation of said rotary member with said upper gripper-jaw moving above and parallel to the surface of the feed-board, a paper-stop for arresting a sheet in feeding position, means for moving the same downwardly below the plane of the feed-board to inoperative position to permit the sheet to be moved past the stop by said gripper-jaws, and means for returning the stop to inoperative position in contact with the under side of the sheet to arrest a second sheet in feeding position immediately after the forward edge of the first sheet has passed the stop, substantially as set forth.

10. Sheet-feeding apparatus comprising the combination of a feed-board, a gripper-jaw mounted above the plane of the surface of the feed-board and adapted to move parallel thereto, a second gripper-jaw, means for moving the same into and out of contact with said first-named gripper-jaw, means for reciprocating the gripper-jaws, a guide mounted stationarily above the plane of the feed-board, a stop underlying said guide, means for moving the stop downwardly to inoperative position to permit a sheet to be forwarded past the stop by said gripper-jaws, and means for moving the stop to operative position immediately after the forward edge of the sheet has passed it, substantially as set forth.

11. Sheet-feeding apparatus comprising the combination of gripper-carriers, upper and lower gripper-jaws carried thereby one of which is movably mounted on the carriers, means for reciprocating the carriers, a stop device governing the position of said movable gripper-jaw, and means for rotating said stop step by step in one direction in accordance with the reciprocation of said carriers, substantially as set forth.

12. Sheet-feeding apparatus comprising the combination of gripper-carriers, upper and lower gripper-jaws carried thereby one of which is pivotally mounted on the carriers, means for reciprocating the carriers, a spring acting on said pivotally mounted gripper-jaw to turn it in a direction to carry its end into contact with the other gripper-jaw, a stop for holding said pivotally mounted gripper-jaw against the tension of said spring, and means for rotating said stop step by step in one direction in correspondence with the reciprocation of said carriers, substantially as set forth.

13. Sheet-feeding apparatus comprising the combination of a feed-board, a gripper-jaw mounted above the plane of the feed-board, a second gripper-jaw, means for moving the same toward said gripper-jaw to raise a portion of the sheet between said jaws, means for reciprocating the gripper-jaws with said upper gripper-jaw moving above and parallel to the plane of the feed-

board, a stop movable to operative and inoperative positions, and means for moving the stop to operative position immediately after the sheet has been raised by said gripper-jaw, substantially as set forth.

14. Sheet-feeding apparatus comprising the combination of a feed-board, gripper-jaws, means for moving said jaws toward each other and thus moving a sheet positioned on said board, means for reciprocating said jaws, a stop, means for moving the stop to inoperative position immediately

after the gripper-jaws grip a sheet, and means for returning the stop to operative position in contact with the sheet immediately after the reciprocatory movement of the gripper-jaws to forward the sheet is begun, substantially as set forth.

This specification signed and witnessed this 31st day of March, 1908.

ALBERT B. DICK.

Witnesses:

I. McINTOSH,
D. S. EDMONDS.