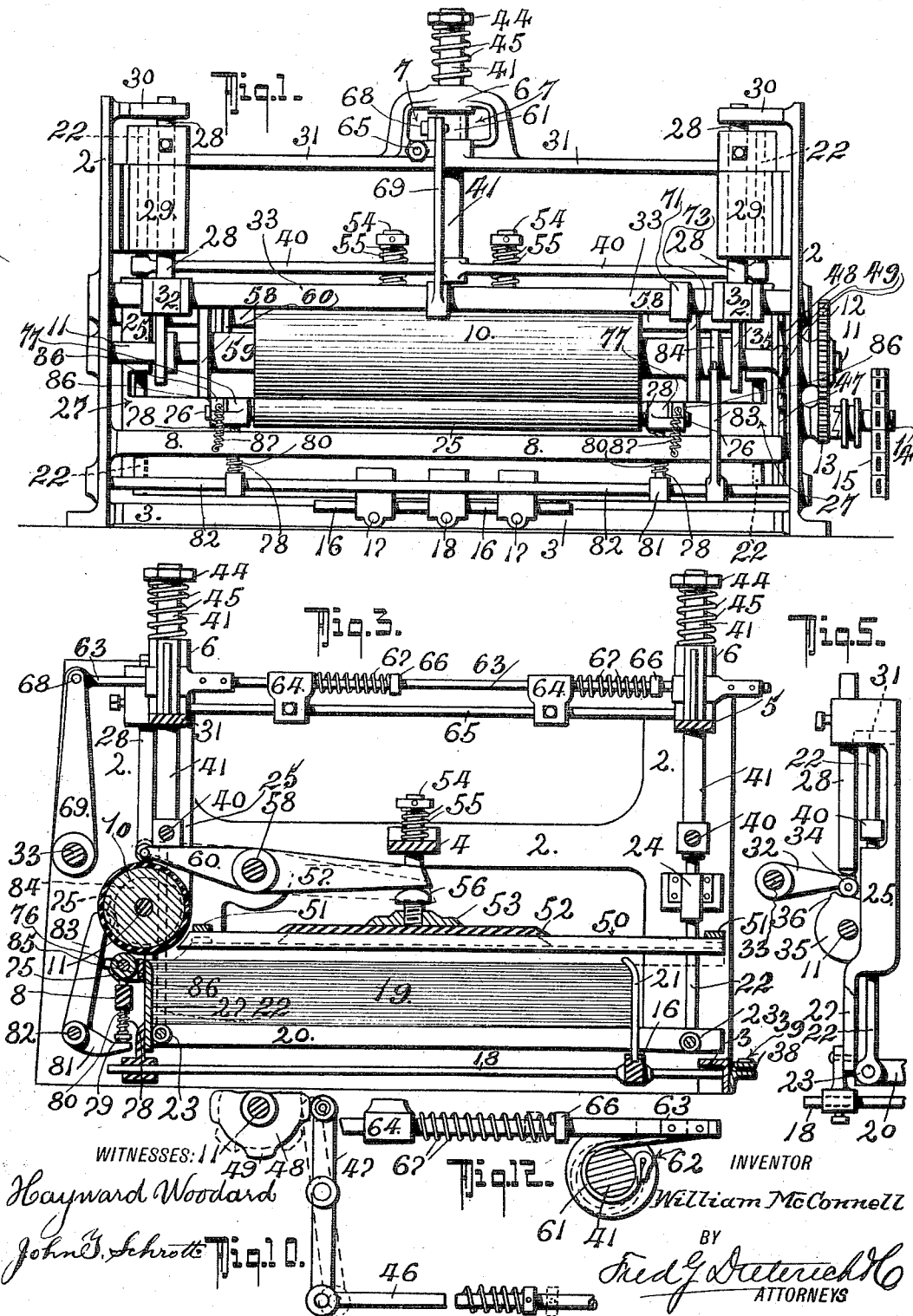


W. McCONNELL.
PAPER FEEDING DEVICE.
APPLICATION FILED MAY 5, 1911.

1,018,577.

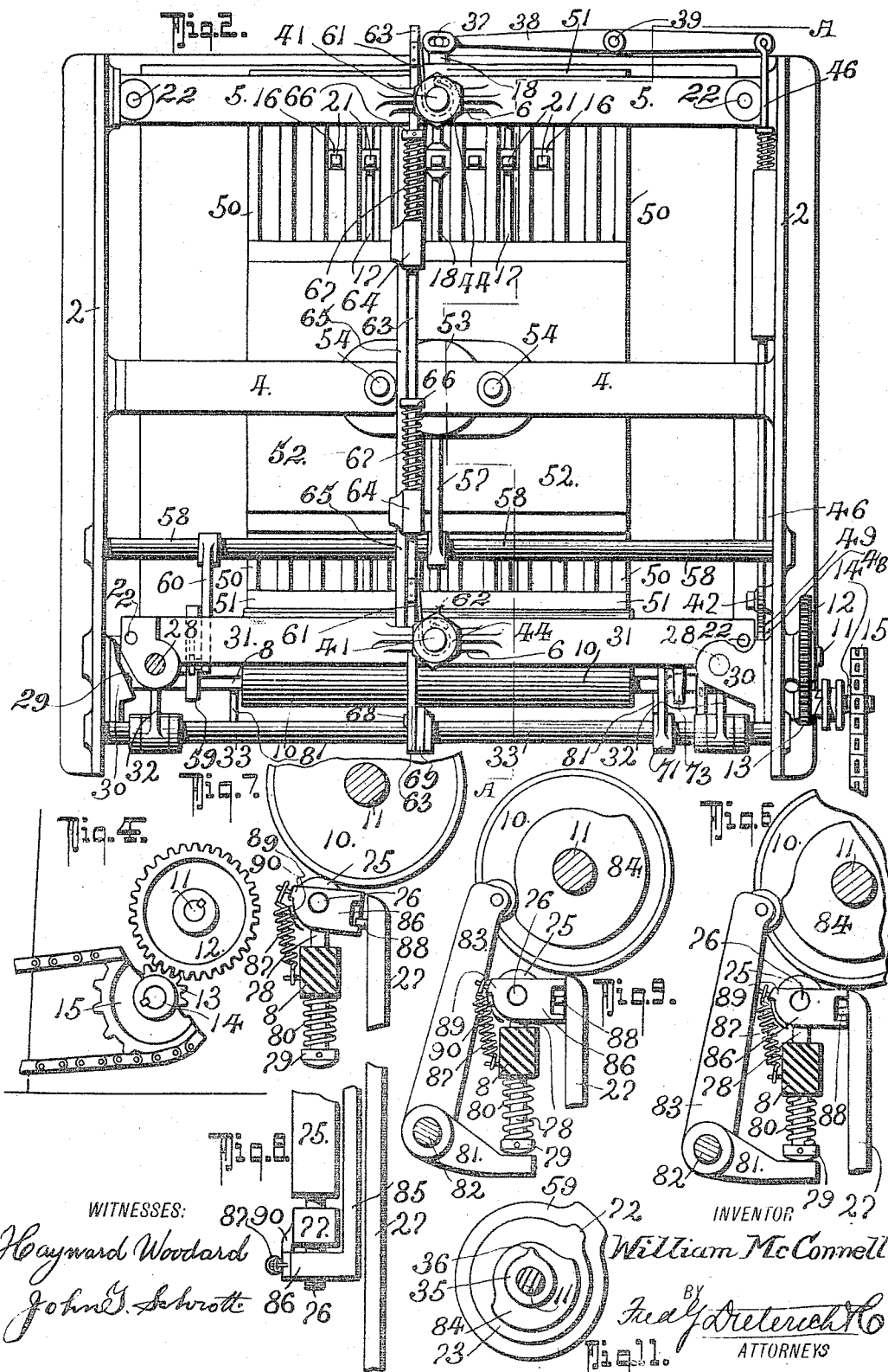
Patented Feb. 27, 1912.

2 SHEETS—SHEET 1.



1,018,577.

2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

WILLIAM McCONNELL, OF VANCOUVER, BRITISH COLUMBIA, CANADA.

PAPER-FEEDING DEVICE.

1,018,577.

Specification of Letters Patent.

Patented Feb. 27, 1912.

Application filed May 5, 1911. Serial No. 625,284.

To all whom it may concern:

Be it known that I, WILLIAM McCONNELL, citizen of the Dominion of Canada, residing at Vancouver, in the Province of British Columbia, Canada, have invented a new and useful Paper-Feeding Device, of which the following is a specification.

This invention relates to a mechanism designed to remove the upper sheet from a pile of cut paper and to feed it to a printing machine and has been particularly devised to feed the sheets of paper one by one to a job printing machine of the cylinder type. Various devices have been used to attain this object but all with which I am acquainted have defects unfitting them for the satisfactory performance of the work, so that hand feeding is frequently regarded as the most satisfactory.

In the machine which is the subject of this application I have avoided the use of any sheet removing means that depends upon the engagement of sharp points with the paper, or which drags the sheet forcibly over or around any surface which is not moving with it, but effect the sheet removing and feeding means by rotating rollers, the main feed roller being rubber covered to offer a better adherence and closer contact.

As the depth of the pile of paper from which the sheets are fed is continually lessening, the invention comprises also a novel means of supporting the table which carries the paper so that it is vertically movable and is automatically elevated to the approximate level of the under side of the feed roller, the stop thereafter being lifted clear of the paper to avoid friction during withdrawal of the top sheet. Means is also provided whereby the front end of the table is lifted to bring the top sheet of the pile in contact with the underside of the rubber covered feed roller by which the top sheet is withdrawn. There are several novel features in connection with these operations and with the subsequent delivery of this sheet to the printing machine which are designed to prevent any dragging or rubbing during that delivery, by which the surface of the paper might be impaired.

The invention is particularly described in the following specification, reference being made to the drawings by which it is accompanied, in which:

Figure 1 is an elevation from the front or delivery end of the machine, Fig. 2, a

plan, Fig. 3, a longitudinal section on the line A A, in Fig. 2, Fig. 4, a side elevation of the feed roller driving gear, Fig. 5, a side elevation showing the suspension of the front end of the table and the means by which it is momentarily lifted to bring the upper sheet of the pile of paper into contact with the feed roller, Figs. 6, 7, 8 and 9 are enlarged details of the fence feed bar and delivery roller, Fig. 10 is a detail of the cam and lever by which motion is imparted to the rectifying comb, Fig. 11 is a somewhat diagrammatic section showing the angular relation of the several cams of the feed roller shaft to one another, and Fig. 12 is a detail of the table-suspension stem clutch.

In these drawings 2 represents the side frames of the machine which frames are secured together by certain cross members 3, 4, 5 and 8, which serve also to support certain parts of the mechanism to which detail reference will be made later. The side frames may also be tied together by such stay rods as may be found necessary.

A shaft 11 rotatable in bearings in the side frames 2 extends across the front end of the machine, on which shaft is secured a rubber covered feed roller 10. This roller shaft 11 is driven by a gear wheel 12 secured on it, outside of the frame 2, in the teeth of which wheel mesh those of a driving pinion 13 that is rotatable on a stud 14 secured in the side frame 2 and which may, by a clutch face be made to drive with the wheel 15 which is driven by a chain from some convenient shaft of the printing machine which this machine may be designed to feed. This machine may thus be either thrown into gear to be operable with the printing machine or be separable from it.

The mid portion of the table 20 which carries the pile 19 of paper sheets is formed of a series of wooden slats extending lengthwise of the machine with interspaces between them through which the tines 21 of the comb may pass, which rectifies the paper against the front fence 27 and the operation of which will be described later. To enable this table 20 to be vertically lifted to keep the upper sheet of the pile, as the sheets are one by one removed, in approximate alinement with the under surface of the feed roller 10 against which the top sheet of the paper is to be lifted to effect its removal, the table is suspended by rods

22 connected at 23 at each corner of the table. The suspension rods 22 are at the after end vertically slidable in bearings 24 secured to each side frame 2 and also above these in bearings in the cross member 5 by which the side frames 2 are secured together.

The rods 22, which support the forward end of the table, are vertically slidable in bearings in a separate frame, see Fig. 5, comprising side members 25 connected together by a cross bar which forms the front fence 27 immediately under the feed roller 10 and a bar 31 across the top. Against this fence 27 the paper is urged in order to rectify it before it is lifted into contact with the feed roller 10. The face of the fence 27 against which the paper is urged and the tines 21 are forwardly curved toward their upper ends so that the edges of the paper will be separated and the front edges of the top sheet moved forward immediately under the lowest part of the feed roller 10. These tines 21 are secured on a cross frame 16 and are maintained horizontal by two guide rods 17 on which they slide, the center stem 18 being connected at 37 to a lever 38 fulcrumed at 39 and reciprocated by a rod 46 and fulcrumed lever 47 from a cam 48 secured on the feed roller shaft 11 and having projections 49. Thus while the machine is running, a succession of sharply delivered endwise movements are imparted to the tines which rectify the pile of paper against the front fence 27 and separate the edges of the sheets in the manner described. This forward frame 25, 27, 31 is itself slidably mounted on the side frames 2 of the machine by pins 28 secured in the sides 25 and slidable in bearings 29, 30 secured to the side frames 2, the vertical movement of the frames being limited between the bearings.

The lower ends of the pins 28 rest upon short levers 32 which are mounted free on a shaft 33, and the under side of this lever 32 is furnished with a small wheel 34 which rests upon the periphery of a cam 35 secured on the feed roller shaft 11. These levers 32 act simply as intermediate bearers between the lower ends of the pins 28 and the cams 35 by which they are moved, in order to relieve the bearing pins of any movement in the direction of the rotation of the cam which might be imparted to it were it to bear directly thereon. The periphery of the cam 35 is concentric with the roller shaft 11 save for a small projection 36 on it, which is designed to momentarily lift the frame 25, 27, 31 in which the forward end of the table 20 is suspended and lower it immediately thereafter. The object of this momentary lift of the forward end of the table 20 is to bring the forward edge of the top sheet of the pile of paper on it into contact with the feed roller.

The slidable rods 22 which carry the table

20 are between their bearings in the side frame and the forward frame respectively, connected at each end of the table by a cross yoke 40 extending between them and projecting upward from the middle of each cross yoke is a guide stem 41. These guide stems 41 are vertically slidable through bearings 6 in the middle of the cross frames 5 and 31, each bearing having an interspace 7 designed to receive a small clutching strap which will be described later. The rods 22, which suspend the forward end of the table 20, are slidable relative to the forward frame 25, 27, 31, but only when the center stem 41, which projects upward from the cross yoke 40 of the rods 22, is unclutched to permit such movement. When the center stem 41 is clutched, the front end of the table will lift with the front frame 25, 27, 31, when acted upon, (see Fig. 5) by the projection 36 of the cam 35, through the intervention of the roller 34 and lever 32. When the center stem 41 is clutched it becomes rigid with relation to the member 31 and moves with the member 31 when motion is imparted to such member 31, by the upward pressure on the members 28 due to the action of the projection 36 and the cam 35, thus causing a connection (which is intermittent due to the action of the clutch 61) between the frame 25—27—31 and the table supporting rods 22 which are carried by the cross yoke 40.

Each center stem 41 is produced beyond the bearing in its cross frame and is provided with a nut 44 between which and the upper side of the bearing is a coiled spring 45. The paper carrying table is thus slidably suspended on the springs 45 which tend to lift it up and will bring the upper sheet of paper of the pile occupying the table, irrespective of the depth of the pile into contact with a stop frame 50. This stop frame is composed, like the table 20, of lengthwise disposed slats of wood with interspaces between, the slats being maintained at the required distance apart by a cross member 51 at each end and at the middle by a more substantial cross member 52 also of wood. On the center of this stop frame is a washer plate 53 from which two guide stems 54 upwardly project and pass through bearings in the cross member 4 in which they are vertically movable. Between a nut on the upper end of each stem and the bearing in 4 are coiled springs 55 which thus tend to lift the stop frame 50. The stop frame 50 is pressed down against the resistance of these springs 55 by a lever 57 secured on a rocking shaft 58 which is supported in bearings in the side frames 2 of the machine and is operated by a lever 60 from a cam 59 secured on the feed roller shaft 11 toward one side of it. The end of the lever 57 bears upon the upper end of a plug 56 screwed into the washer plate by means of which the position

of the stop frame may be adjusted to accord to the requirements of paper of different thicknesses.

The table 20 having a normal tendency to lift under the influence of the springs 45 throughout the range of the depth of the pile of paper on it, means is provided to clutch or hold it when it has moved up under the influence of these springs 45 and has brought the upper sheet of the pile of paper on it against the stop frame 50. This clutching is effected by a small flexible band 61 which encircles each center stem 41 in the space 7 dividing the bearings 6. One end of each band 61 is anchored at 62 to the bearing 6 and is secured at the other end to a rod 63 extending between the two cross members 31 and 5 and slidable in bearings 64 adjustably secured to a tie rod 65 between the cross members. On the stem 63 between each bearing 64 and an adjustable collar 66 secured on the rod are springs 67 that will normally hold the rod 63 in a position to lock the clutch bands 61 on the table suspension stems 41. At the forward end of the rod 63 is pin connected at 68 to a lever 69 which is secured on a shaft 33 mounted in bearings in the side frames 2 and having at one end a short lever 71 designed to be engaged and lifted by a projection 72 of a cam 73 secured on the feed roller shaft 11. The paper carrying table 20 thus has a vertically slidable movement uniform at each end, tending upward under the influence of the springs 45 but is normally clutched against that upward tendency by the clutch bands 61. It is released from that clutch and permitted to rise to bring the top sheet of the pile of paper against the stop frame 50 when the projection 72 of the cam 73 engages the end of the lever 71 and draws the rod 63 against the resistance of its springs 67 to release the bands 61. The table is then free to rise until the upper sheet comes in contact with the stop frame 50 which has previously been moved down to the lower limit of its movement by engagement of the lever 60 of the cam 59. The lower limit of this stop frame is adjusted by the plug 56 to approximately the level of the underside of the feed roller 10.

As the upward lift of the forward end of the table 20, which brings the forward end of the top sheet of paper into contact with the rubber covered feed roller 10 to effect the withdrawal of that top sheet, is only momentary, means must be provided to maintain the sheet of paper in contact with the roller 10 until it passes within the control of the delivery roller by which the progress of the sheet is continued until it is within the reach of the printing machine feed. This object is attained by the following device: Extending along the underside of the feed roller 10 is a freely rotatable delivery roller

75 the axle 76 of which is carried in bearings 77 supported by stems 78 which are vertically movable in a cross member 8 of the machine frame. The lower end of each stem 78 where it projects below the cross frame 8 has a collar 79 secured to it between which and the underside of the cross frame is a coiled spring 80 and the lower end of each stem rests upon a short lever 81 secured at each end of a rocking shaft 82 which is oscillated to lift and lower the delivery roller 75 by a lever 83 secured to the shaft 82, a small roller on the end of which lever bears upon the periphery of a cam 84 secured on the feed roller shaft 11. This cam 84 is so formed that it will lift the delivery roller and hold it in contact with the feed roller 10 for about half of a revolution of the feed roller, lowering it from such contact during the other half. Parallel to the delivery roller 75 and between it and the fence 27 is a bar 85 carried from the axle 76 of the delivery roller by bearings in projections 86 from the ends of the bar 85. Between each projection 86 and the cross bar 8 in which the bearing stems are vertically movable, are springs 87 which tend to keep the front edge of the bar 85 in contact with the feed roller 10, and this front edge of the bar is so maintained while the front end of the table 20 is lifted to effect the removal of the top sheet of paper and for a short time thereafter, but as the front end of the table and fence 27 are again lowered from the feed roller a projecting pin 88 from the fence 27 reaches the lower end of an elongated slot in the bar 85 and pulls it down from contact with the feed roller 10 by which time the removed sheet of paper has entered between the feed roller 10 and the delivery roller 75. The projection 86 of the bar 85 has a stop 89 projecting from it, which stop engages a projection 90 from the bearing 77 and insures that the edge of the bar adjacent to the fence shall not be lifted by the action of the spring 87 above the level necessary to bring it into contact with the periphery of the feed roller 10 when the delivery roller is lifted.

The action of this paper feeding device may now be fully described: The pile of paper 19 on the table 20 having by the action of the tines 21 of the rectifying comb, been urged against the fence 27, the edges of the upper sheets in conforming to the curvature of the adjacent face of the fence against which they are urged will have been separated from one another and the front edge of the top sheet will be immediately under the lowest point of the feed roller 10. The stop frame 50, will, by the action of the cam 59 and its lever system, be moved downward against the resistance of its springs to the position indicated by the dotted lines in Fig. 3, that is, approximately in line with the

under side of the feed roller 10. Further rotation of the feed roller shaft 11 to which the several operative cams are attached, will bring the projection 74 of the cam 73 into position to lift the lever 71 and move the rod 63 to release the friction bands 61 which normally hold the central stems 41. The table 20 is then free to be lifted by the influence of the springs 45 and will bring the top sheet of the pile of paper 19 into contact with the stop frame 50. The movement, which releases the brake bands, is only momentary, further rotation immediately permitting the normal condition of the grip of the brake straps to be resumed. Immediately the stop frame 50 has effected the object of defining the limit of the vertical rise of the table, it is lifted clear of the paper under the action of the springs 55 by the removal of the restraining influence of its cam 59. Further rotation of the roller shaft 11 brings the projection 36 of the cam 35 to lift the front frame 25, 27, 31, in which the front end of the table is supported and thereby lifts the front edges of the top sheet of paper of the pile into frictional contact with the rotating rubber covered feed roller 10. By this frictional contact the top sheet of paper is withdrawn from the pile and its front edge is delivered between the feed roller 10 and the bar 85 which bar is in the position, shown in Fig. 9. The delivery roller 75 and with it the bar 85 is then lifted into contact with the feed roller by means of the cam 84 and its lever connections, the fence 27 is lowered, and the movement of the paper continues until the front edge of the paper passes between the delivery roller and the feed roller, the friction of this contact of the paper with the rubber covered feed roller 10 being greater than that of the paper over the polished metal of the contact bar 85. The time occupied by the front edge of the paper in making this movement is very short, and the bar 85 is drawn down by the fence 27 during the latter part of that member's downward movement, see Fig. 7, which movement is delayed slightly by the curved slope of the after part of the projections 36 of the cam 35 by which the fence and front end of the pile were lifted. This lowering of the fence 27 and bar 85, as soon as practicable, is to avoid dragging of the paper over their surfaces. The paper now being fairly introduced between the rolling contact of the feed roller 10 and the delivery roller 75 the movement of the paper is continued until the front edges of the paper comes in contact with the feed stop of the printing machine, when the delivery roller is, by the action of its cam 84, lowered so that the paper is not crowded against the stop.

The essential features of this machine may be enumerated as consisting in: The

particular conformation of the front fence 27 and the tines 21 of the rectifying comb, by which the edges of the paper are effectively separated and the withdrawal of more than one sheet at a time prevented, and the front edge of the top sheet projected under the feed roller; the manner of suspending the paper carrying table 20 under a constant tension upward and normally restraining it against that tendency until it is required to allow it to lift against the stop frame 50; the particular operation of the stop frame 50 to stop the upper sheet of the pile at the approximate level of the feed delivery, and the removal of that stop after the object has been attained and before the front end of the table is lifted to bring the forward edge of the upper sheet of paper in the pile into contact with the feed roller; the particular combination and coöperation of the front fence 27 with the contact bar 85 and the delivery roller 75 by which the withdrawal of the top sheet of paper is effected and it is passed to the delivery roller in a manner that obviates dragging of the paper to any extent over parts that are not moving with it; and the release of the contact of the delivery roller with the feed roller when the leading edge of the paper approximately reaches the stop of the printing machine feed so that the paper will not be crowded against that stop, if the printing machine feed is not in a position to receive it.

Having now particularly described this invention and the manner of its operation, I hereby declare that what I claim as new and desire to be protected in by Letters Patent, is:

1. As a means for removing paper sheet by sheet from a pile, the combination with a suitable frame, of a feed roller rotatable within the frame, a table on which a pile of paper is carried, means for automatically maintaining the upper sheet of paper of the pile on the table at the approximate level of the under side of the feed roller and out of contact therewith, and means for periodically lifting the forward end of the table so as to bring the forward edge of the top sheet into frictional contact with the feed roller.

2. In a machine of the class described, the combination with a suitable frame within which a feed roller is rotatable, of a table frame on which the pile of paper is placed, of a fence situated at the forward end of the table frame the front face of which fence is immediately below the axis of the feed roller and the back face of which adjacent to the upper pile is in cross section curved forward to the top front edge, means for rectifying the paper and urging it into contact with this fence said means comprising a horizontally slidable frame having up-

wardly projecting tines to pass through the table frame the upper ends of which tines are curved approximately to the curvature of the back face of the fence and means cooperative with the rotation of the feed roller for reciprocating the rectifying tines.

3. In a machine of the class described, the combination with a suitable frame within which a rubber covered feed roller is rotatable, of a table frame on which the pile of paper is placed, of a stop frame against which the top sheet of the pile of paper is arrested at the approximate level of the under side of the feed roller, means for urging upward the table frame, means for normally holding the table frame against this lifting tendency, means cooperative with the rotation of the feed roller for releasing this holding means, means for lifting the stop frame, means cooperative with the rotation of the feed roller for moving down the stop frame against this lifting tendency and means cooperative with the rotation of the feed roller for lifting the forward end of the table to bring the forward edge of the top sheet of the pile of paper into frictional contact with the feed rollers.

4. In a machine for the purpose specified, the combination with a suitable frame within which a feed roller is rotatable, a table frame on which the pile of paper is placed which table frame is suspended within the frame of the machine on springs which tend to lift the table upward, means for clutching the table suspension stems against that upward tendency of the springs, means cooperative with the rotation of the feed roller for momentarily releasing the clutching means, a stop frame slidably supported parallel to and above the table, means cooperative with the feed roller for moving this stop frame down to the level of the under side of the feed roller, means for lifting the stop frame from such position when the table frame has been secured, and means cooperative with the rotation of the feed roller for lifting the forward end of the paper carrying table to bring the forward edge of the top sheet into contact with the feed roller.

5. In a machine of the class described, the combination with a suitable frame within which a rubber covered feed roller is rotatable, of a table frame on which a pile of paper is placed, means for suspending the table frame from the frame of the machine said means comprising a suspension rod pivotally connected to each corner of the table those at the after end of the machine being slidable in bearings in the machine frame, those at the forward end slidable in bearings in a frame which is itself vertically movable in bearings in the machine frame the forward and after pair of suspension rods being connected by cross yokes from each of which upwardly projects a central

stem, a spring on each stem to sustain the weight of the table and its pile of paper and having a tendency upward, means for locking the central stems against this upward tendency, means cooperative with the feed roller for releasing the clutching means, a stop frame against which the upper sheet of the paper is checked and means cooperative with the feed roller for lifting the forward end of the table.

6. In a machine of the class described, the combination with a suitable frame in which a rubber covered feed roller is rotatable, a paper carrying table, means for maintaining the top sheet of the pile of paper on the table at the approximate level of the under side of the feed roller and a fence extending across under the feed roller parallel to and immediately under its axis, means for lifting the forward end of the table to bring the forward edge of the top sheet of paper on the pile into contact with the feed roller, a delivery roller parallel to and in front of the fence, means for rotatably supporting the delivery roller so that it may be lifted into contact with the feed roller, a bar parallel to the feed roller and between it and the fence said bar being susceptible of movement and with the fence so that it will be lifted into contact with the feed roller and lowered from contact during the latter part of the downward out of contact movement of the fence.

7. As a means for feeding paper from a pile and delivering it sheet by sheet to a printing machine, the combination with a suitable frame on which the pile of paper is carried and a feed roller by which the removal of the top sheet is effected, of means for suspending the paper carrying table in a manner that it will have a tendency upward, of means for normally holding it against that tendency, of a stop frame against which the top sheet of the pile is checked at the approximate level of the under side of the feed roller, means for lifting that stop frame from its stop position after the table has been secured in the stop position, means for lifting the forward end of the table to bring the forward edge of the top sheet of paper of the pile into momentary contact with the feed roller and means for continuing the delivery of the top sheet after its withdrawal from the pile.

8. In a machine of the class described, the combination with a rubber covered feed roller, a frame within which the rubber covered feed roller is rotatable, of a table frame composed of lengthwise arranged slats, means for suspending this table from the frame of the machine said means comprising at the forward end a frame composed of side members, an upper cross rail and a lower fence rail projected forward so as to extend immediately beneath the feed roller, each side

member having a vertically disposed pin on which the forward frame is slidably mounted in bearings on the machine frame, a suspension rod pivotally connected to each corner of the table frame the rods at the back end of the table being slidably in bearings secured to the frame of the machine and at the forward end of the table in bearings in the forward end frame, a yoke connecting each pair of rods at the back and the front end, a central stem upwardly projecting from each cross yoke and slidably through a bearing in a cross member of the machine frame, a nut threaded on the upper end of each stem and a spring between each nut and the cross member through which the stem is slidably, means for clutching the central suspension stems against the lifting tendency of their springs, means coöperative with the rotation of the feed roller for releasing the suspension stem clutches, a stop frame parallel to and above the table and slidably mounted to have a normal tendency upward, means coöperative with the rotation of the feed roller for moving the stop frame down against this tendency and means coöperative with the feed roller for lifting the forward end of the table.

9. In a machine of the class described, the

combination with a rubber covered feed roller rotatably mounted in a suitable frame, of a paper carrying table supported beneath so as to be susceptible of automatic vertical movement upward as the depth of the pile of paper is reduced, a fence across the forward end of the table the front face of which fence is immediately beneath the axis of the feed roller, a delivery roller rotatably supported in advance of and parallel to the fence, a contact bar parallel to the fence and between it and the delivery roller to the axle of which it is connected, means for lifting the forward end of the table and the fence, independent means coöperative with the feed roller for lifting the delivery roller and the contact bar into contact with the feed roller and means coöperative with the movement of the fence for lowering the bar out of contact with the feed roller during the latter part of the downward movement of the fence.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM McCONNELL.

Witnesses:

ROWLAND BRITAIN,
WILLIAM S. SOUTAR.