F. WAITE.

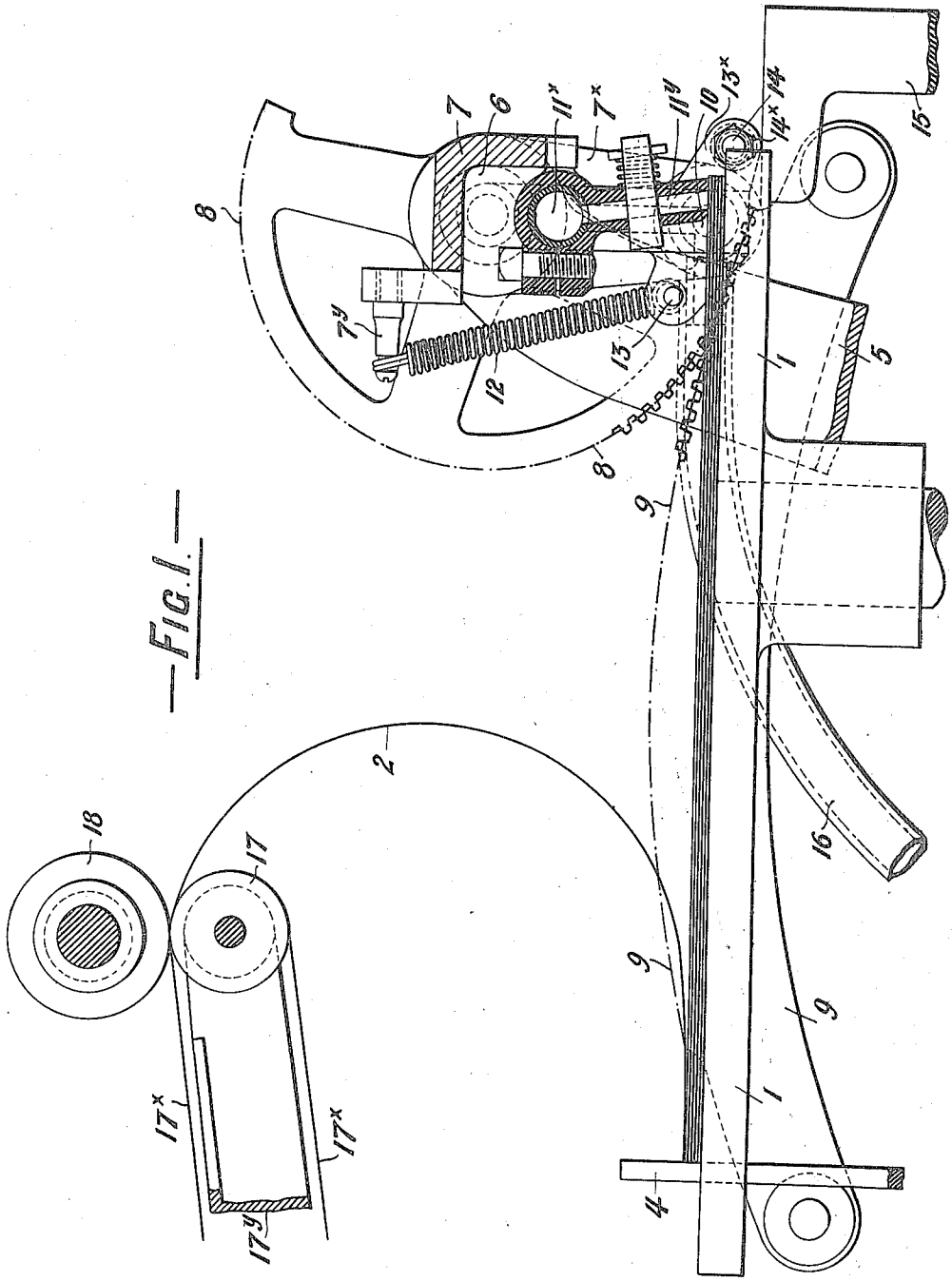
PNEUMATIC SHEET FEEDING APPARATUS FOR PRINTING MACHINES AND THE LIKE.

APPLICATION FILED MAY 5, 1915.

1,160,796.

Patented Nov. 16, 1915.

3 SHEETS—SHEET 1.



—FIG. 1.—

Witnesses:

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by
Chas. C. Stauffer
Atty

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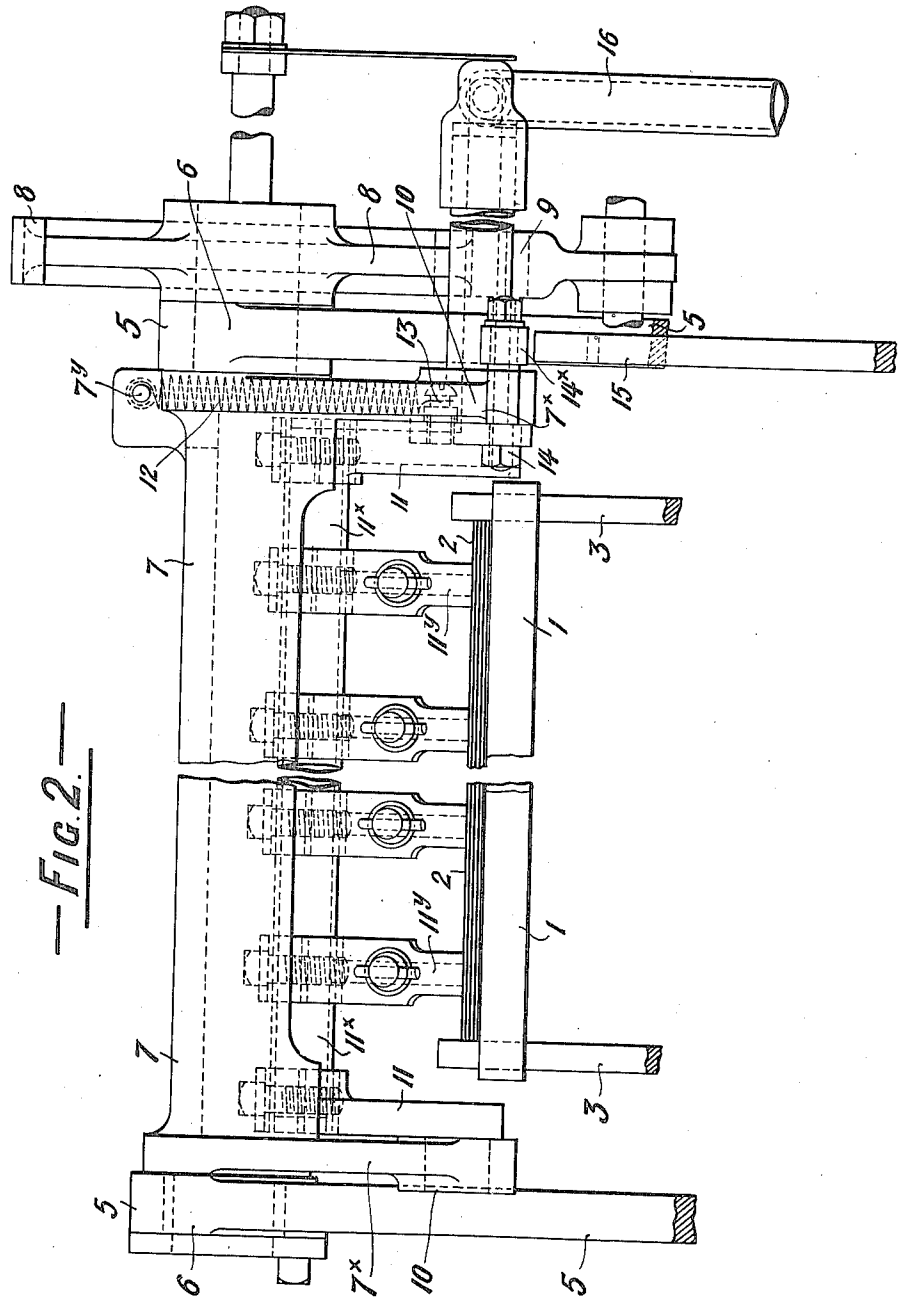


FIG. 2.

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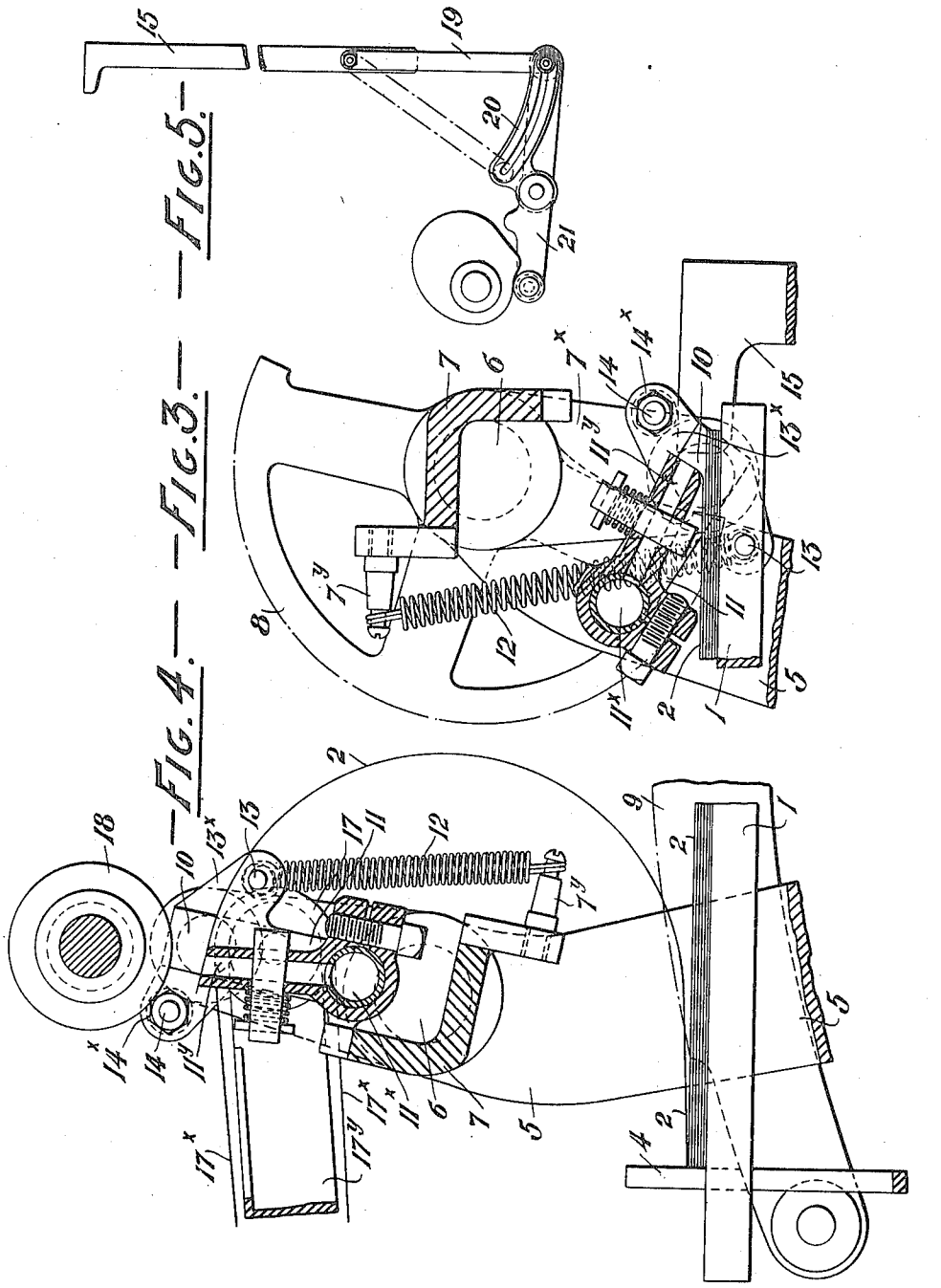
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3 SHEETS—SHEET 3.



—FIG. 5.—

—FIG. 3.—

—FIG. 4.—

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UNITED STATES PATENT OFFICE.

FRED WAITE, OF OTLEY, NEAR LEEDS, ENGLAND.

PNEUMATIC SHEET-FEEDING APPARATUS FOR PRINTING-MACHINES AND THE LIKE.

1,160,796. Specification of Letters Patent. Patented Nov. 16, 1915.

Application filed May 5, 1915. Serial No. 25,948.

To all whom it may concern:

Be it known that I, FRED WAITE, a subject of the King of Great Britain, residing at Otley, near Leeds, in the county of York, England, have invented certain new and useful Improvements in Pneumatic Sheet-Feeding Apparatus for Printing-Machines and the like, of which the following is a specification.

This invention relates to improvements in pneumatic sheet-feeding apparatus of the kind wherein the sheets are picked up singly from a pile by a suction device geared with a rack or its equivalent, the arrangement being such that the suction device, after taking hold of the sheet, is traveled along the rack and thereby simultaneously rotated through approximately a half circle and thus inverted so as to cause the sheet to be turned back upon itself and its front edge to be brought into engagement with traveling tapes or the like adapted to carry it forward to the printing or other mechanism.

Now the object of this present invention is to so construct the suction apparatus as to cause it to first bend up the engaged edge of the sheet so as to separate it from its fellows and then turn over and travel the said sheet forward without disturbing the position of its rear portion upon the pile of sheets, before finally delivering the said sheet between positively driven rollers provided with tapes by which it is carried forward to the printing or other mechanism.

The important features of my apparatus comprise a pair of pivoted rocking arms (or other cam- or crank-actuated reciprocating means) carrying between them a rotatably mounted plate of arched or other section formed with depending end brackets, a suction member rotatably mounted between the depending end brackets of the arched plate and being formed with a series of suction fingers whose suction faces are situated on a level with or within a short distance of the pivotal point of the entire suction member, means for rocking the suction member on its pivots to cause the suction fingers, after taking hold of the sheet, to bend upward the gripped edge of the sheet and so separate it from its fellows immediately prior to the rocking arms being actuated to travel forward the arched plate and its suction member, together with means for rotating the arched plate during such forward travel through approximately a half circle to invert the suction member and so cause the sheet to be turned back upon itself ready for delivery.

My invention will be understood by reference to the accompanying drawings, in which the same reference numerals indicate the corresponding parts in all the figures; wherein:—

Figures 1 and 2 are respectively a sectional side elevation and a front elevation of a pneumatic sheet-feeding apparatus constructed according to my invention, showing the parts in the position they occupy at the moment the suction member is taking hold of the topmost sheet of the pile. Fig. 3 is a sectional side elevation of the same apparatus, showing the suction member tilted to bend upward the edge of the engaged sheet so as to separate it from its fellows. Fig. 4 is a sectional side elevation of the same apparatus, showing the suction member in the inverted position with the engaged sheet bent back upon itself ready to be taken by the delivery rolls; the engagement of the sheet by the said rolls being shown in the left-hand portion of Fig. 1. Fig. 5 is a detail view, drawn to a reduced scale, showing means for regulating the lift of the bar by which the suction member is tilted.

Referring to the drawings, 1 is a table carrying a pile of sheets 2 which is retained in position on the said table by means of side guides 3 and a back guide 4.

5 is a pair of pivoted rocking arms (the upper ends only of which are shown) which carry between them, through the medium of end trunnions 6, a rotatably mounted plate 7 of L-section, and to one of the trunnions 6 of the said plate 7 is fixed a toothed segment 8 meshed with a toothed rack 9 fixed to a stationary framing (not shown), while the plate 7 is formed with depending end brackets 7^x between which, through the medium of end trunnions 10, is pivoted a suction member consisting of a pair of end arms 11 carrying a tubular upper portion 11^x

having a series of depending fingers 11^y whose suction faces are located on a level with the pivotal point 10 of the arms 11 of the said suction member. To the plate 7 is fixed a stud 7^y which is connected by means of a spring 12 to a stud 13 of a bracket 13^x fixed to one of the trunnions 10 of the pivoted suction member, whereby the latter is normally held against the plate 7 which acts as a stop as shown at Fig. 1, while the opposite end of the bracket 13^x is fitted with a stud 14 carrying a bowl 14^x adapted to be operated by a cam-actuated bar 15 so as to rock the said suction member about its pivotal point 10 in the brackets 7^x of the plate 7 in a direction away from the latter as shown at Fig. 3.

The tubular portion 11^x of the suction member communicates by way of one of its arms 11 and trunnions 10 (which are made hollow) with a suction tube 16 leading to an air-exhausting pump (not shown), and the radius of the toothed segment 8 is greater than that of the fingers 11^y of the suction member so that, on being operated, its surface speed of rotary travel exceeds that of the latter; while the fingers 11^y themselves are spaced apart sufficiently to allow them, at the end of their forward travel (see Fig. 4), to pass between a number of rolls 17 carrying the front end of a series of delivery tapes 17^x and mounted on pivoted arms 17^y which are raised intermittently to bring the said rolls 17 into contact with other rolls 18, preferably positively driven, the sheet being lifted by the tapes 17^x from the inverted suction-fingers 11^y and caused to pass into the grip of the two sets of rolls 17, 18 (as shown in the left-hand portion of Fig. 1) and be urged forward thereby along the said tapes 17^x.

At the commencement of the feeding operation, the fingers 11^y of the suction member rest with their suction faces upon the upper surface of the topmost sheet 2 adjacent to the outer edge thereof as shown at the right-hand portion of Fig. 1, when the suction is set up so as to cause the sheet to adhere to the said suction fingers 11^y. The cam-actuated bar 15 is then raised into contact with the bowl 14^x of the pivoted suction member so as to rock the latter on its pivots 10 against the action of the spring 12, which independent rocking action of the suction member causes it to be tilted from the vertical position (Fig. 1) into an oblique position, with its foremost sheet-contacting edge as the pivotal point, so that the gripped edge of the sheet 2 is bent upward without altering the position of the latter on the pile as shown at Fig. 3, and this upward bend has the effect of separating the said sheet 2 from its fellows and of effectually preventing more than one sheet being carried at one time. The rocking arms 5 are now actuated to impart the forward travel of the suction apparatus along the rack 9, which action causes the suction member to be freed from the bar 15 and so returned to its normal position against the plate 7, while the continued rolling of the toothed segment 8 along the rack 9 causes the suction apparatus to arrive at the end of its forward travel in an inverted position with the sheet 2 consequently bent back upon itself as shown at Fig. 4, and owing to the fact that the toothed segment 8 is of greater radius than the suction member, this turning back or doubling of the sheet is effected without disturbing its rearmost portion; and thus in the event of the suction member losing its grip upon the sheet 2, the latter is enabled to fall back exactly into its original position between the stationary guides 3, 4 of the table 1. On the suction apparatus arriving at the end of its forward travel, the fingers 11^y of the suction member pass in between the rolls 17 of the set of delivery tapes 17^x, which at this moment has its receiving end in the lowermost position with the level of the tapes 17^x below that of the sheet 2 held by the suction member (see Fig. 4), when the pivoted arms 17^y are raised so as to cause the tapes 17^x to lift the forward end of the sheet away from the suction member and into contact with the rolls 18 (see left hand portion of Fig. 1), whose action in combination with the driven tapes 17^x is to cause the sheet 2 to be fed forward on to the tapes 17^x and so conveyed to the printing or other machine.

The bar 15 which lifts to impart the bend to the sheet is rendered capable of regulation by the mechanism shown at Fig. 5, wherein the bar 15 (which is made vertically slidable in guides not shown) is connected by a link 19 to a curved slot 20 of a cam-actuated lever 21, the arrangement being such that when the link 19 is in the position shown in full lines the maximum lift is given to the bar 15, while when the link 19 is in the position shown in dotted lines the bar 15 has practically no lift at all.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In pneumatic sheet-feeding apparatus of the kind specified; the combination with a reciprocating carrier, of a pair of depending end brackets rotatably mounted on said carrier, a suction member rotatably mounted between the depending end brackets of the carrier and being formed with a series of suction fingers whose suction faces are situated on a level with or within a short distance of the pivotal point of the entire suction member, means for rocking the suction member on its pivots to cause the suction fingers, after taking hold of the sheet, to bend upward the gripped edge of the

sheet, means for rotating the depending end brackets through approximately a half circle during the forward travel of the reciprocating carrier to invert the suction member and so cause the sheet to be turned back upon itself ready for delivery.

2. In pneumatic sheet-feeding apparatus of the kind specified; the combination with a reciprocating carrier, of a pair of depending end brackets rotatably mounted on said carrier, a suction member rotatably mounted between the depending end brackets of the carrier and being formed with a series of suction fingers whose suction faces are situated on a level with or within a short distance of the pivotal point of the entire suction member, a spring adapted to normally hold the pivoted suction member in contact with the end brackets, means for rocking the suction member on its pivots against the action of the spring to cause the suction fingers, after taking hold of the sheet, to bend upward the gripped edge of the sheet and so separate it from its fellows immediately prior to the carrier being actuated to travel forward the depending brackets and their suction member, together with means for rotating the depending end brackets during such forward travel through approximately a half circle to invert the suction member and so cause the sheet to be turned back upon itself ready for delivery.

3. In pneumatic sheet-feeding apparatus of the kind specified; the combination with a reciprocating carrier of a plate of arched section rotatably mounted between the said arms and being formed with depending end brackets, a suction member rotatably mounted between the depending end brackets of the arched plate and being formed with a series of suction fingers whose suction faces are situated on a level with or within a short distance of the pivotal point of the entire suction member, a spring adapted to normally hold the pivoted suction member in contact with the arched plate, a bowl on the pivoted suction member, a cam-actuated bar or tappet adapted to engage the said bowl to rock the suction member about its pivotal point away from the arched plate against the action of the spring to bend upward the gripped edge of the sheet and so separate it from its fellows immediately prior to the carrier being actuated to travel forward the arched plate and its suction member, together with means for rotating the arched plate during such forward travel through approximately a half circle to invert the suction member and so cause the sheet to be turned back upon itself ready for delivery.

4. In pneumatic sheet-feeding apparatus of the kind specified; the combination with a pair of pivoted rocking arms, of a plate of arched section rotatably mounted between the said arms and being formed with depending end brackets, a suction member rotatably mounted between the depending end brackets of the arched plate and being formed with a series of suction fingers spaced apart and having their suction faces situated on a level with or within a short distance of the pivotal point of the entire suction member, a spring adapted to normally hold the pivoted suction member in contact with the arched plate, a bowl on the pivoted suction member, a cam-actuated bar or tappet adapted to engage the said bowl to rock the suction member about its pivotal point away from the arched plate against the action of the spring to bend upward the gripped edge of the sheet and so separate it from its fellows immediately prior to the rocking arms being actuated to travel forward the arched plate and its suction member, means for rotating the arched plate during such forward travel through approximately a half circle to invert the suction member and cause the sheet to be turned back upon itself, a number of rolls between which the fingers of the suction member are free to pass at the end of their forward travel, together with means for raising the said rolls into contact with other rolls to lift the sheet from the inverted suction fingers into the grip of the two sets of rolls by which it is urged forward along tapes.

5. In pneumatic sheet-feeding apparatus of the kind specified; the combination with a pair of pivoted rocking arms, of a plate of arched section rotatably mounted between the said arms and being formed with depending end brackets, a suction member rotatably mounted between the depending end brackets of the arched plate and being formed with a series of suction fingers spaced apart and having their suction faces situated on a level with or within a short distance of the pivotal point of the entire suction member, a spring adapted to normally hold the pivoted suction member in contact with the arched plate, a bowl on the pivoted suction member, a cam-actuated bar or tappet adapted to engage the said bowl to rock the suction member about its pivotal point away from the arched plate against the action of the spring to bend upward the gripped edge of the sheet and so separate it from its fellows immediately prior to the rocking arms being actuated to travel forward the arched plate and its suction member, means for regulating the lift of the cam-actuated bar or tappet, means for rotating the arched plate during its forward travel through approximately a half circle to invert the suction member and cause the sheet to be turned back upon itself, a number of rolls between which the fingers of

the suction member are free to pass at the end of their forward travel, together with means for raising the said rolls into contact with other driven rolls, to lift the sheet from the inverted suction fingers into the grip of the two sets of rolls by which it is urged forward along tapes.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

FRED WAITE.

Witnesses:
AUGUSTUS E. INGRAM,
FRED HAMMOND.

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