C. W. HALBERG, G. B. MIER & A. J. HODGE.

SHEET FEEDER.

APPLICATION FILED MAY 7, 1912. RENEWED FEB. 19, 1915.

1,161,768.

Patented Nov. 23, 1915.

2 SHEETS—SHEET 1.

FIG. 1.

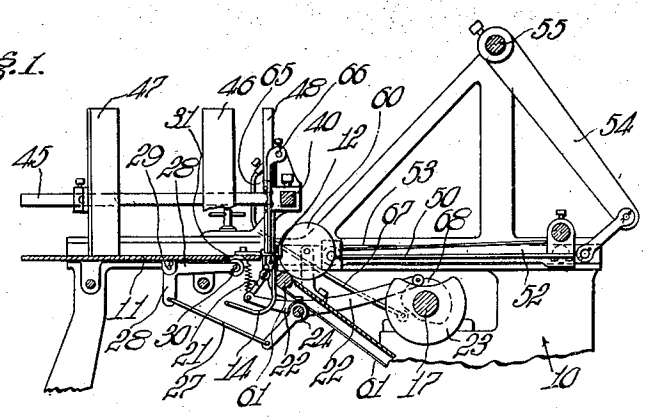


FIG. 2.

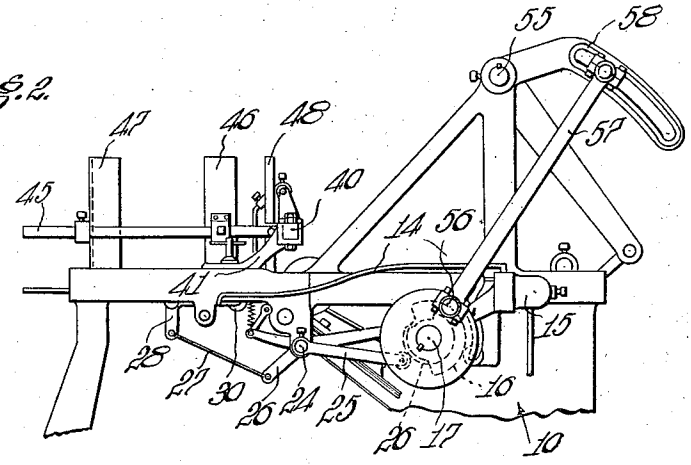
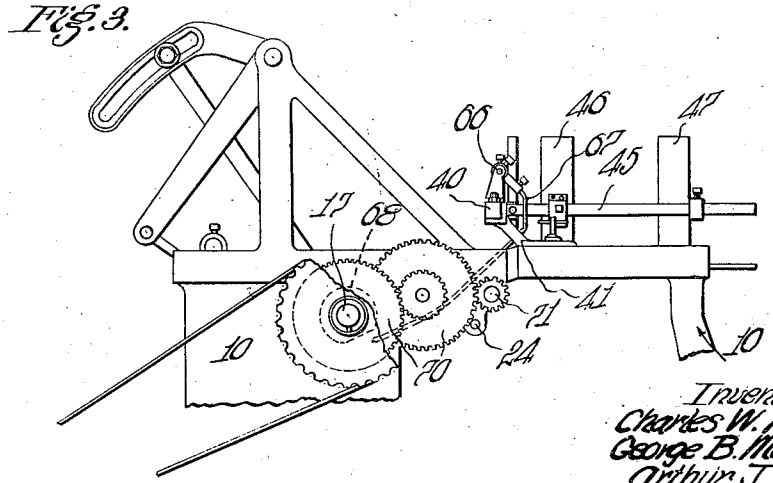


FIG. 3.



Witnesses.
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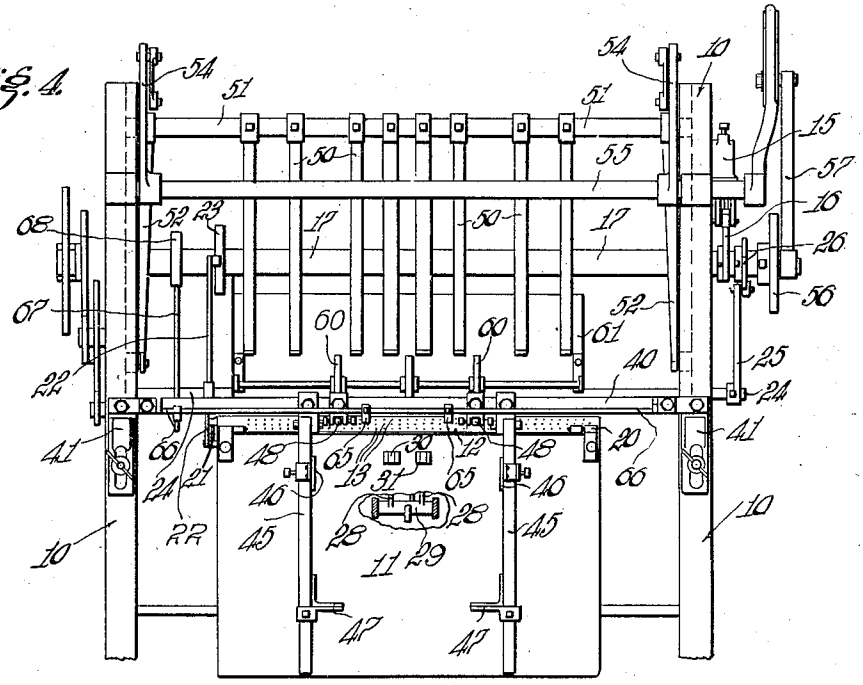
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2 SHEETS—SHEET 2.

Fig. 4.



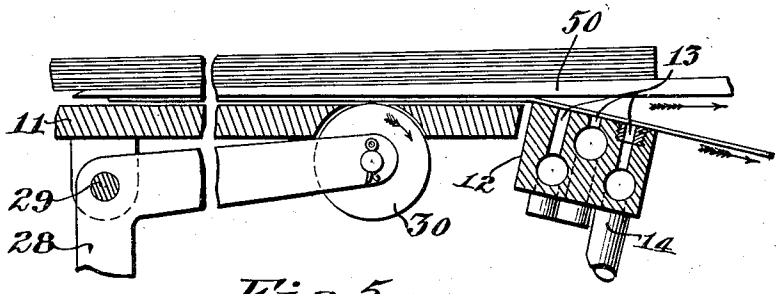


Fig. 5.

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UNITED STATES PATENT OFFICE.

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SHEET-FEEDER.

1,161,768. Specification of Letters Patent. Patented Nov. 23, 1915.

Application filed May 7, 1912, Serial No. 695,755. Renewed February 19, 1915, Serial No. 9,423.

To all whom it may concern:

Be it known that we, CHARLES W. HALBERG, GEORGE B. MIER, and ARTHUR J. HODGE, citizens of the United States, residing at Los Angeles, Los Angeles, and Pasadena, respectively, in the county of Los Angeles, State of California, have invented new and useful Improvements in Sheet-Feeders, of which the following is a specification.

This invention relates to improvements on our Letters Patent No. 937,807 issued to Arthur J. Hodge on October 26th, 1909; and it consists in certain changes of operation and construction for the improvement and simplification of the invention described and claimed in that patent.

In our former patent there is described and claimed a mechanism including the combination of a means to separate a sheet from the remainder of a pile, means to enter between the single sheet and the remainder of the pile, and means on the entering means to secure the single sheet thereto. Preferably we have used a suction apparatus for securing the sheet to the entering means, which have been in the form of fingers.

We now wish to show and claim a construction involving the combination of means extraneous to the feeding fingers, or other means, to hold the single sheet in engagement with the fingers; such means being substituted for the preferable suction means heretofore used on the fingers themselves. Broadly, we have provided means which will press the sheet against the feeding means, whether by movement of one or the other. And it will be understood that the exact structure of the feeding means is here of no consequence; we have shown simple feeding fingers, but changes therein or additions thereto will not avoid our invention. The means extraneous of the feeding fingers preferably take the form of freely revolving rollers which are pressed against the fingers at certain periods of the operation of the mechanism. The paper is held between fingers and the freely revolving rolllers and, when the fingers move outwardly the sheet of paper moves with them into a continuously running feeding device.

We wish also in this application to set forth other improvements in our feeding mechanism, chief among which is an improved means for adjusting the mechanism for feeding sheets of paper of different thicknesses and stiffness. In order to separate a single sheet from the remainder of the pile we bend the edge portions of that sheet away from the pile, leaving an opening into which the fingers may pass. In order to attain satisfactory results heavy sheets must be bent farther from their edges and lighter sheets must be bent closer to their edges; and our improved mechanism affords means for making suitable adjustments to effect these ends.

In the accompanying drawings we have shown an improved preferred form of apparatus, in which drawings:

Figure 1 is a vertical longitudinal section of our improved feeding mechanism. Fig. 2 is a side elevation of the same, corresponding in aspect to Fig. 1. Fig. 3 is an opposite side elevation of the same. Fig. 4 is a plan view of our improved mechanism. Fig. 5 is an enlarged section showing the section of the feeder fingers and coöperating mechanisms.

In the drawings 10 designates a suitable frame-work which, in the present embodiment of our invention, is a portion of a printing press frame; but this may be as desired, it being understood that our present invention may be combined with any machine needing the services of a sheet feeder. This frame 10 carries a suitable sheet supporting table 11 upon which a pile of sheets is placed in the manner shown and described in the patent above referred to. (It will be understood, however, that this present invention may be applied to feeding an uppermost sheet from a pile as well as a lowermost one, this feature being mentioned in the patent referred to). At the forward edge of supporting table 11 we have shown a hinged suction apron 12 provided with a series of suction ports 13 preferably arranged in lines parallel to the edge of the supporting table 11 and at different distances from that edge. The suction ports 13 are connected by a suitable hose connection 14 to a valve 15 operated by a suitable cam 16 on shaft 17. Valve 15 controls the supply of suction from a suitable vacuum pump of any design. The apron 12 is hinged at 20 so that it may be thrown downwardly at its forward edge (the edge

to the right in Fig. 1) and thus bend the forward edge of the lowermost sheet of paper downwardly and away from the forward edges of the remaining sheets in the pile. The downward movement of apron 12 is accomplished through the medium of a connecting rod 21, a pivoted lever 22, and a cam 23. Lever 22 is loosely mounted on rock shaft 24 so that it may oscillate under the action of cam 23 independently of the rock shaft 24. The rock shaft 24 is oscillated through the medium of an arm 25 coöperating with a cam 26 on shaft 17. Mounted on rock shaft 24 are suitable arms 26 connected by rods 27 to bell crank levers 28 pivoted at 29 to the under side of the supporting table 11. These bell crank levers carry on their other ends freely revolving rollers 30 adapted to be projected through apertures 31 in table 11 by the action of the cam mechanism.

We will now explain the devices for holding the pile in place on the table and for the adjustment of its position for heavy or light paper. A cross bar 40 is supported at each end on brackets 41 which are adjustably mounted on the frame as is shown in Fig. 4. Cross bar 40 carries rearwardly extending arms 45 adjustable thereon to provide for papers of different widths. Vertical pile guiding members 46 and 47 are adjustably mounted on bars 45 so as to guide the paper pile in its gradual downward movement. The paper pile is confined along its forward edge by vertical members 48 whose inner edges stand substantially over the suction apron 12. It will be seen that by adjusting the position of brackets 41 on the frame, the position of members 48 over the suction apron may be varied so as to vary the amount of edge portion of the sheet pile which overhangs the table onto the suction apron. If heavy stiff sheets are being handled, it is necessary to bend them at some distance back from their forward edges. The members 48 will then be placed forwardly so as to allow a maximum portion of the sheet pile to overhang onto the suction apron. When feeding thin light sheets, the members 48 will be placed rearwardly so as to allow only a small portion of the sheet pile to overhang the suction apron. In this case the suction hose is connected to the innermost line of suction ports. We have found that with three lines of suction ports, and with the adjustability described, we are enabled to accurately feed sheets of paper of all the weights and thicknesses commercially used. This is an important feature of our invention; and we wish to claim it as broadly as possible.

The feeding members or fingers 50 are operated much in the same manner as described in the patent referred to. These fingers are carried upon a transverse rod or bar 51 mounted on a suitable frame 52 sliding in grooves 53 in opposite sides of the frame. The fingers are reciprocated through the medium of an oscillating arm 54 mounted on rock shaft 55 which is oscillated from a crank 56 with connecting rod 57. This connecting rod adjustably attaches to a slotted arm 58 mounted on shaft 55, so that the movement of the fingers 50 may be accurately adjusted. It will be understood that what we term "fingers" may be made and used in any equivalent form; their multiplicity and spacing as shown are conveniences and not essentials. In order to keep the pile of sheets from binding against the uprights 48, there are provided movable fingers 65 which may be vibrated rearwardly against the pile to drive it away from the uprights 48. These fingers 65 are mounted on a small shaft 66 which is oscillated through the medium of an arm 67 following a cam 68 on shaft 17.

In operation the apron 12 first moves downwardly on its hinges and carries with it the forward edge of the lowermost sheet of the pile, making a V-shaped opening into which the feeder members, the fingers 50, may enter. The feeder fingers move rearwardly and move into the opening and between the single lowermost sheet and the remainder of the pile, lifting the pile off the single sheet. When the fingers have reached the position farthest to the left in Fig. 1, then the rollers 30 are moved upwardly so that their peripheries project above the table surface, pressing the single sheet against two of the feeder fingers. We have chosen the two central feeder fingers to be engaged by the rollers 30, finding that such an arrangement gives good results, but it will be seen that it is not necessarily arranged in this manner, as the number of feeder fingers may be varied from one to any number desired and the rollers 30 made to engage with any of the fingers. It is preferable, however, that there be rollers arranged symmetrically with reference to a central longitudinal axis along which the paper is moved. When the rollers have moved up against the feeder fingers (as shown in Fig. 5) the feeder fingers then move outwardly and the rollers are rotated by frictional contact with the paper which is itself pressed tightly against the fingers. Immediately the forward edge of the sheet has moved far enough to be engaged by the feeder wheels 60, then the rollers 30 are lowered and the sheet is subsequently fed by the feeding rollers 60 and the roll and belt arrangement 61. The roll and belt 61 are preferably rotated continuously through the means of a suitable gearing train 70 shown in Fig. 3, the shaft designated 71 being the shaft which carries the rollers designated 61 in Fig. 1.

Our invention is thus shown to consist

broadly in the combination of a sheet separating means, a feeding member adapted to enter into the separation, and a freely moving surface means to press the single sheet against the sheet engaging surface of the feeding member; irrespective of whether the said means moves toward the feeding member or the member moves toward the means. It is only necessary to have relative movement of the member and means, and, as stated, the feeding member may be of any character, and it sheet engaging surface may bear any desired relation to its body.

Having described our invention, we claim:

1. A sheet feeder, comprising a sheet-pile support, means for separating an outermost sheet from the remainder of the pile, a set of feeding fingers adapted to enter between the single sheet and the remainder of the pile, means including freely revolving rollers to press the single sheet against the fingers, and means to positively withdraw the feeding fingers to feed the single sheet out of the pile.

2. A sheet feeder, comprising a sheet support, means to aline a pile of sheets with their edges over-hanging the sheet support, a suction apron pivoted beneath the overhanging edges of the sheets, a set of feeding fingers adapted to enter the pile above the lowermost sheet, means including freely revolving rollers independent of the fingers to press the sheet against the fingers from below, and means to move the feeder fingers outwardly from the pile to feed the single sheet therefrom.

3. In a sheet feeder, a reciprocating feeding member adapted to enter a pile of sheets between a single outermost sheet and the remainder of the pile, means including a freely revolving roller to press the single sheet against the feeding member, and means for withdrawing the feeder member from the pile to withdraw the single sheet therefrom.

4. In a sheet feeder, a reciprocating feeding member adapted to enter a pile of sheets between a single outermost sheet and the remainder of the pile, means including a sheet engaging surface free to move with the feeding member to press the single sheet against the feeding member, said means being normally independent of the feeding member, and means to withdraw the feeding member from the pile to withdraw the single sheet therefrom, the said sheet engaging surface moving with the feeding member by virtue of frictional engagement of said single sheet with both.

5. In a sheet feeder, reciprocating feeder fingers adapted to enter a pile of sheets between a single outermost sheet and the remainder of the pile, a freely revolving roller adapted for movement toward the fingers to press the single sheet against them, means to move the rollers against the fingers, and means to withdraw the fingers from the pile to withdraw the single sheet therefrom.

6. A sheet feeder, comprising a sheet-pile support, means to separate an outermost sheet from the remainder of the pile, a reciprocating feeder member adapted to enter between the pile and the separated sheet, a freely moving surface normally independent of the feeder member, means to move said surface to press the separated sheet against the feeder member, and means to move said member outwardly, the separated sheet being thereby moved out from the pile by frictional engagement with said member.

7. A sheet feeder, comprising a sheet-pile support, means to separate an outermost sheet from the remainder of the pile, a feeder member, means to move said member into and out of the pile adjacent the separated sheet, a freely moving surface normally independent of the feeder member, and means to move said surface relative to the feeder member to press the separated sheet against the feeder member, whereby said sheet is pressed into frictional engagement with the feeder member and the outward movement of the member causes the corresponding movement of said sheet and of said freely moving surface.

8. A sheet feeder comprising a sheet-pile support, means for separating an outermost sheet from the remainder of the pile, a flat faced feeder finger, means to reciprocate the finger into and out of the sheet-pile adjacent the separated sheet, a movable freely revolving roller, and means to move said roller to press the separated sheet against the flat face of the feeder finger, whereby the outward movement of the finger will cause a similar movement of said sheet and a rotation of said roller.

9. In a sheet feeder, a reciprocating feeding member adapted to enter a pile of sheets between a single outermost sheet and the remainder of the pile, a sheet pressing member having a surface movable by frictional engagement with the single outermost sheet, and means to move the sheet pressing member to press the single sheet against the feeding member, whereby on the outward stroke of the feeding member the sheet is moved by frictional engagement with the member and the pressing member is moved by frictional engagement with the sheet.

10. In a sheet feeder, a reciprocating feeding member adapted to enter a pile of sheets between a single outermost sheet and the remainder of the pile, a sheet pressing member having a surface movable by frictional engagement with the single outermost sheet, and means to move the pressing and feeding members relatively one toward the other to grip the single sheet frictionally between them, whereby on the outward

stroke of the feeding member the sheet is moved by frictional engagement with said member and the pressing member is moved by frictional engagement with the sheet.

11. In a sheet feeder, a reciprocating feeding member adapted to enter a pile of sheets between a single outermost sheet and the remainder of the pile, a sheet pressing roller free to revolve by frictional engagement with the single outermost sheet, and means to move the roller and feeding member relatively one toward the other to grip the single sheet frictionally between them, whereby on the outward stroke of the feeding member the sheet is moved by frictional engagement with the member and the roller is revolved by frictional engagement with the sheet.

In witness that we claim the foregoing we have hereunto subscribed our names this 24th day of April 1912.

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G. B. MIER.
ARTHUR J. HODGE.

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