

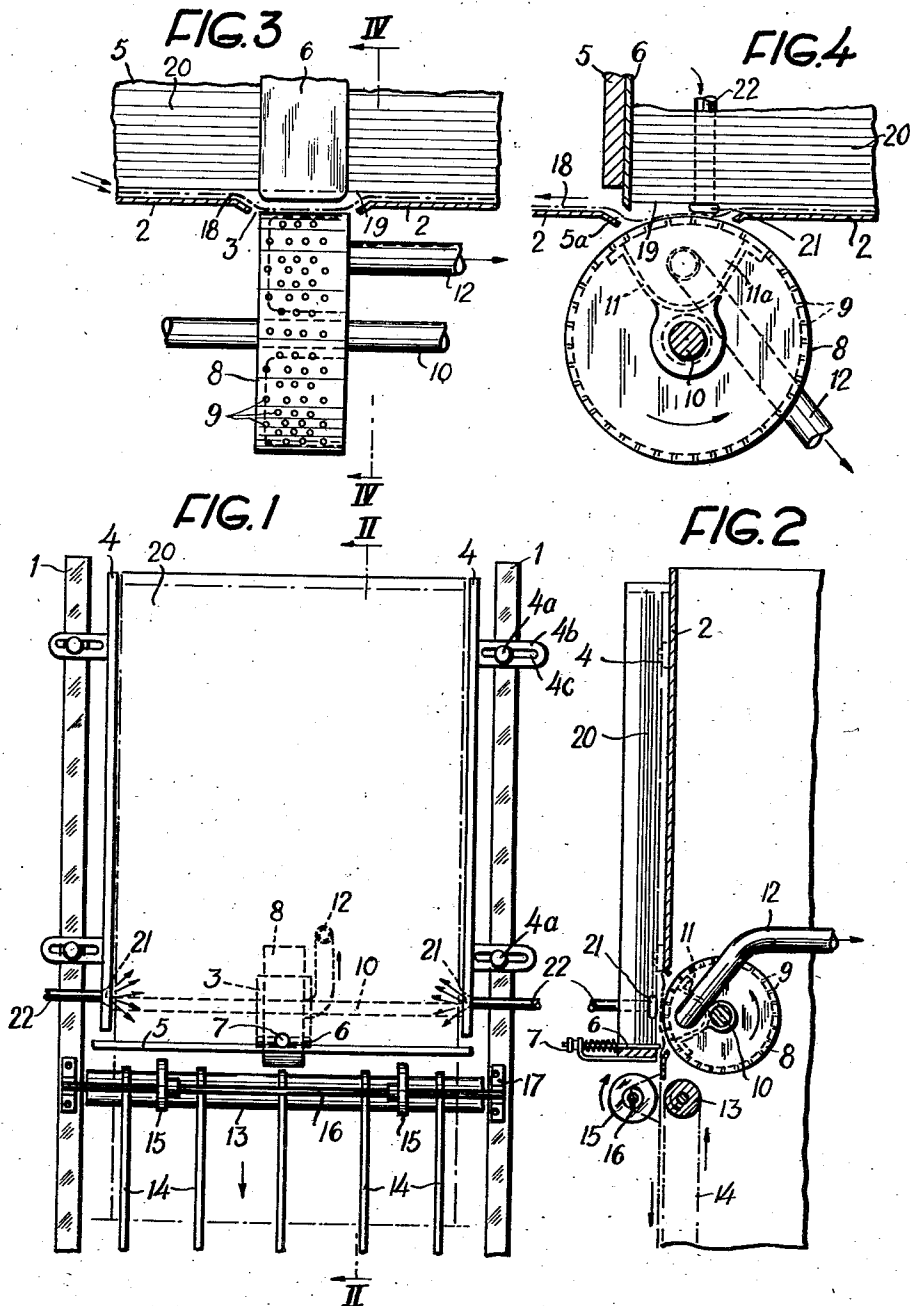
Nov. 5, 1957

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2,812,178

SHEET FEEDING APPARATUS

Filed May 11, 1953



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2,812,178

SHEET FEEDING APPARATUS

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Application May 11, 1953, Serial No. 354,179

5 Claims. (Cl. 271—29)

The present invention refers to the type of sheet feeding apparatus, particularly sheet feeders for printing presses and the like, wherein a movable suction member seizes and feeds sheets from the lower side of a pile of sheets.

The object of the invention is above all to improve apparatus of this type so that an increased safety for the proper separation of the sheets one at a time from the lower side of the sheet pile is obtained. A further object of the invention is to provide a sheet feeding and separating mechanism having a considerable capacity of work.

In a sheet feeding apparatus according to the invention, a suction member has a suction surface of such a shape and in such a position relatively to the lower side of the pile of sheets that the lowermost sheet is deflected by the suction surface in two directions at right angles to each other. Hereby an exceptional guarantee is provided for safety in the separation of the sheets. The speed of the sheet separation may be carried far, if the suction member is formed as a rotary drum with a peripheral surface forming the suction surface to seize and to feed the sheets from the lower side of the pile of sheets. The deflection of the sheet in one direction may then be effected by causing the suction surface to attract the sheets downwardly from the pile of sheets, whereas the deflection of the sheet in the other direction is effected by the sheet being caused to bear along the curved periphery of the drum, inasmuch as the plane of rotation of the drum coincides with the feeding direction. The separation of the sheets may be further improved by a blowing member arranged in a position at the border of the lower portion of the pile of sheets such that the lowermost sheet is lightened by the air current from the blowing member.

The invention will be more clearly described in the following description of an embodiment illustrated by way of example in the accompanying drawing. The drawing refers to the application of an apparatus constructed as a sheet feeder which is viewed in Fig. 1 from above and in Fig. 2 in a section on line II—II in Fig. 1. Fig. 3 shows the sheet separating members from the front side of the apparatus to a larger scale, and Fig. 4 correspondingly shows a section on line IV—IV in Fig. 3. In the various figures certain details, non-relevant to the invention, are omitted for the sake of simplicity.

As shown in the drawing, the side frames 1, 1 of the apparatus carry a feeding table 2, preferably a plate having a rectangular opening 3 of a breadth smaller than the breadth of the sheets to be received on the table. Provided on each side of the sheet supply arranged in the form of a pile 20 is a side member 4, 4 for guiding the sheets laterally. The side members rest on the table plate while being adjustable in a lateral direction. For the adjustment there are provided screws 4a threaded into the lateral frames and extending through slits 4b in lugs 4c secured to the outer sides of the members 4, 4. Provided above the front portion of the table 2 is a sheet support 5, a slit 5a being formed between the lower edge of said

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support and the table, through which slit the sheets are intended to pass. Provided at a point between the lateral edges of the sheet support 5, preferably midway between the same, is an obstruction 6 forming a tongue depending behind the slit 5a. Said tongue may be raised and lowered with respect to the table 2 by means of a screw 7.

For the removal and advancement of the lowermost sheet in the sheet pile there is provided a movable suction member having a curved surface, which in the first place pulls the sheet downwardly in the opening 3 of the table 2 and which secondly bends the fore edge thereof forwardly and downwardly, so that it can pass underneath the lower edge of the tongue 6. The suction member has the configuration of a wheel or drum 8 provided at the periphery thereof with a number of small, preferably radial apertures 9. This suction drum 8 is secured on a rotating shaft 10. The periphery of the suction drum 8 is located immediately underneath the aperture 3 in the table 2. Provided in the upper portion of the suction drum 8 is a body 11 fitting perfectly to the inner circumference thereof and forming a suction chamber 11a, which may communicate through a pipe 12 with some suitable source of suction, such as a vacuum pump. A suction effect may thus be produced in the suction chamber 11a, so that air will flow in through the small apertures 9 within the portion of the periphery of the suction drum enclosed by the body 11. The suction chamber 11a is open toward the opening 3 along a certain zone of the peripheral surface of the suction drum, and suction is effected over this suction zone, whereby the sheet may be kept in engagement with the drum along a definite portion of its periphery due to the suction.

Provided in front of the suction drum is a rotating band roller 13 having conveyer bands 14 running thereon, which are stretched in known manner between said band roller and a front band roller not shown in the drawing. Above the band roller 13 there is provided a shaft 16 carrying sheet rollers 15, said shaft being mounted in the lateral frames 1, 1 by means of bearing pedestals 17.

Provided at the lower portion of the sheet pile near the fore edge thereof are blowing members adapted by blowing of air inwardly against the sides of the sheet pile to lighten the lowermost sheet from the remainder of the pile, so that the separation of the sheet from the pile shall be prepared in a suitable manner. These blowing members consist of blowing nozzles 21, 21 arranged in each one of the lateral supports 4 approximately opposite the suction drum 8, said blowing nozzles permitting of being brought into communication with an air compressor through a hose conduit 22.

As will appear from Figs. 3 and 4, the margin of the opening 3 in the table plate 2 is bent downwardly toward the suction drum 8, whereby the sheet will be guided toward and from the drum when being fed from the sheet supply.

The mode of operation of the apparatus described is broadly as follows:

When at rest the supply of sheets lies on the table plate with the edges thereof immediately adjacent to the sheet supports 4, 4, 5. The upper peripheral portion of the suction drum is located in the opening 3 inconsiderably below the top surface of the plate. The tongue 6 is adjusted so that a very small slit is provided between the suction drum and the tongue.

If the blowing air is first admitted through the nozzles 21, 21, an air cushion is formed underneath the sheet supply, said cushion tending to raise the same, while the air loosens the lowermost sheets at the same time. The pressure of the sheet supply on the lowermost sheet is thus reduced, so that the sheets will be pulled forth more

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readily. If the suction drum is now brought under vacuum, the lowermost sheet 18 will be sucked rigidly onto the same to be compelled to bend downwardly in order to keep close to the periphery round the drum. This will take place within the borders of the rectangular opening 3 in the plate 2. The sheet will thus be brought below the lower edge of the tongue 6.

It should be observed that the sheet 18 is not only pulled down toward the drum 8 by being bent at the middle thereof in a plane paralleling the front side of the pile of sheets but is also bent downwardly freely in the plane of rotation of the drum, that is to say, in the feeding direction, by engaging the curved periphery of the drum along the suction zone thereof. Hereby the sheet is subjected to tension aiding toward proper separation from the overlying sheet. Such separation is facilitated by the air pressure above atmospheric caused by the blowing air on the lower side of the pile of sheets and by the bevelled borders of the opening 3.

The sheet 19 next to the lowermost one does not deflect downwardly, however, since no suction effect is exerted on the same. The lowermost edge of the tongue 6 will thus be located on a level lower than that of the sheet 19, for which reason only the lowermost sheet has its front portion as pulled down by the suction drum located below the tongue. According as the drum rotates, the lowermost sheet 18 will be fed forwardly through the slit 5a so as to be conveyed further to the sheet rollers 15 and out onto the conveyer track formed by the bands 14. The sheet is then conveyed by this track to a printing press or other place of use. As soon as the sheet has been advanced so that the drum has become uncovered by the same, the drum seizes the next sheet in the manner described, and so forth.

The invention is not limited to the construction shown in the drawing. As an example of deviating embodiments might be mentioned that a plurality of suction drums may be arranged for one and the same sheet pile, such suction drums being uniformly distributed along the front side thereof, an adjustable sheet obstruction being provided for each suction drum. Although the formation of the suction member as a drum involves considerable advantages, it is conceivable to form the same as a reciprocating suction cushion with a suction surface curved in the same manner as the drum, so that the sheet will be bent in two planes at right angles to each other. The apparatus may also be modified in numerous other respects within the scope of the invention.

What I claim is:

1. In a sheet feeding apparatus the combination with a stationary table having an opening and adapted to receive a pile of sheets, said table having an opening located between the sides thereof and beneath the front of

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the pile of sheets, said opening being of a width less than the width of the table to provide margins on the sides of the opening for supporting the pile of sheets on each side of the opening, a separating mechanism comprising a rotatable suction drum positioned beneath said opening and having a perforate suction surface, the upper portion of which lies in register with said opening and spaced below the top surface of said table carrying the pile of sheets and adapted to be engaged by the sheets, the axial length of the drum being smaller than the dimension of the sheets parallel to the axial direction of the drum, means to form a suction zone along a definite portion of the upper periphery of the drum, and an obstruction adjacent the front of the pile of sheets, above the opening said obstruction being of a width less than the width of the opening, said obstruction having an edge at a level below the plane of the lowermost sheet of the pile to prevent plane sheets to be fed but to permit the lowermost sheet sucked down into engagement with the drum along the periphery thereof and below said top surface to pass said edge.

2. An apparatus according to claim 1 further comprising blowing nozzles located at each side of the table and adapted to blow air on the pile of sheets to separate the sheets.

3. A sheet feeding apparatus as claimed in claim 2, and further comprising laterally adjustable side members for guiding the pile of sheets, the blowing nozzles being located adjacent said side members and opening through apertures in the side members.

4. A sheet feeding apparatus according to claim 1, in which the opening of the table is provided with margins and the margins of the table opening are bent down toward the drum.

5. An apparatus according to claim 1 further comprising means for adjusting the obstruction member toward and away from the table to enable setting thereof to a position with its edge below the top surface of the table.

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