

June 16, 1953

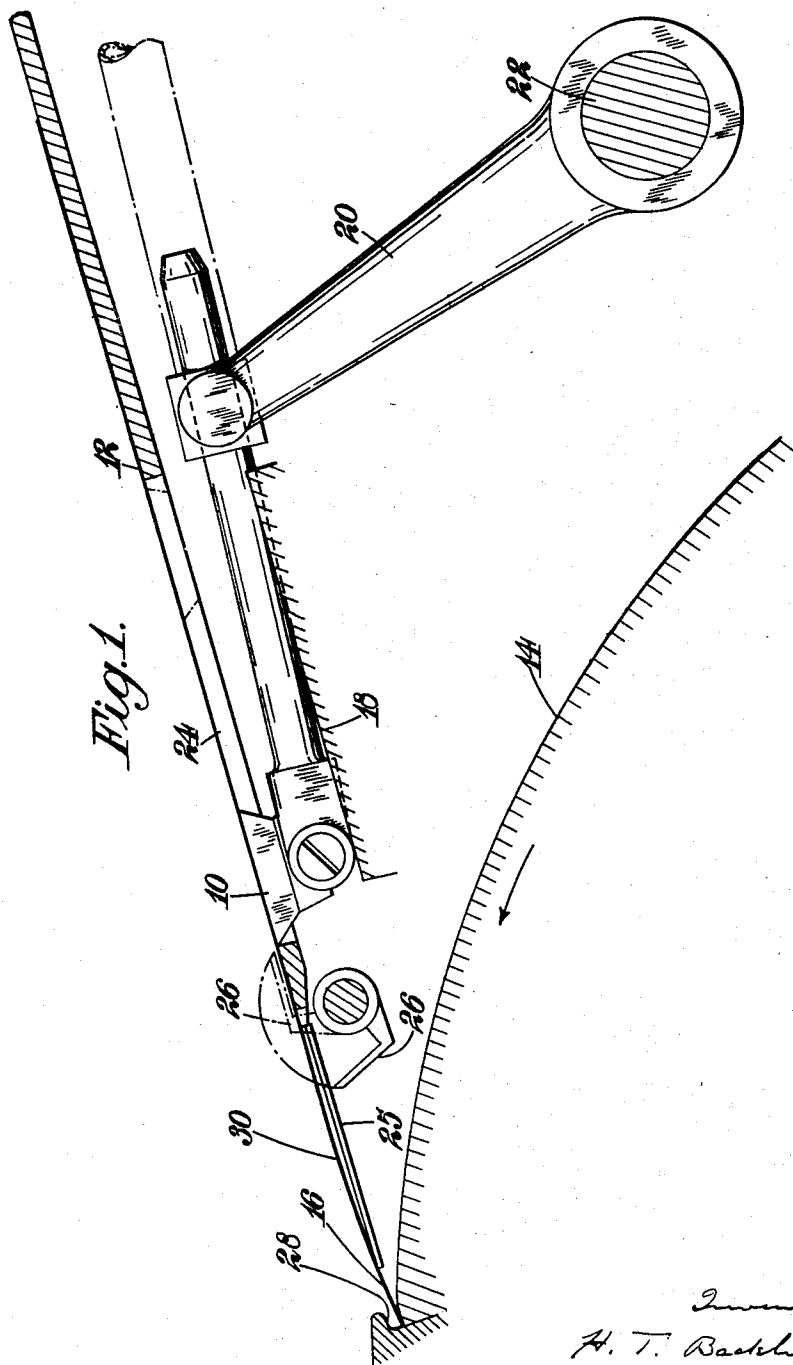
H. T. BACKHOUSE

2,642,282

MECHANISM FOR FEEDING SHEETS TO ROTARY DRUM MACHINES

Filed Nov. 9, 1949

5 Sheets-Sheet 1



Inventor:
H. T. Backhouse
By William, Rich & Brown
Attys

June 16, 1953

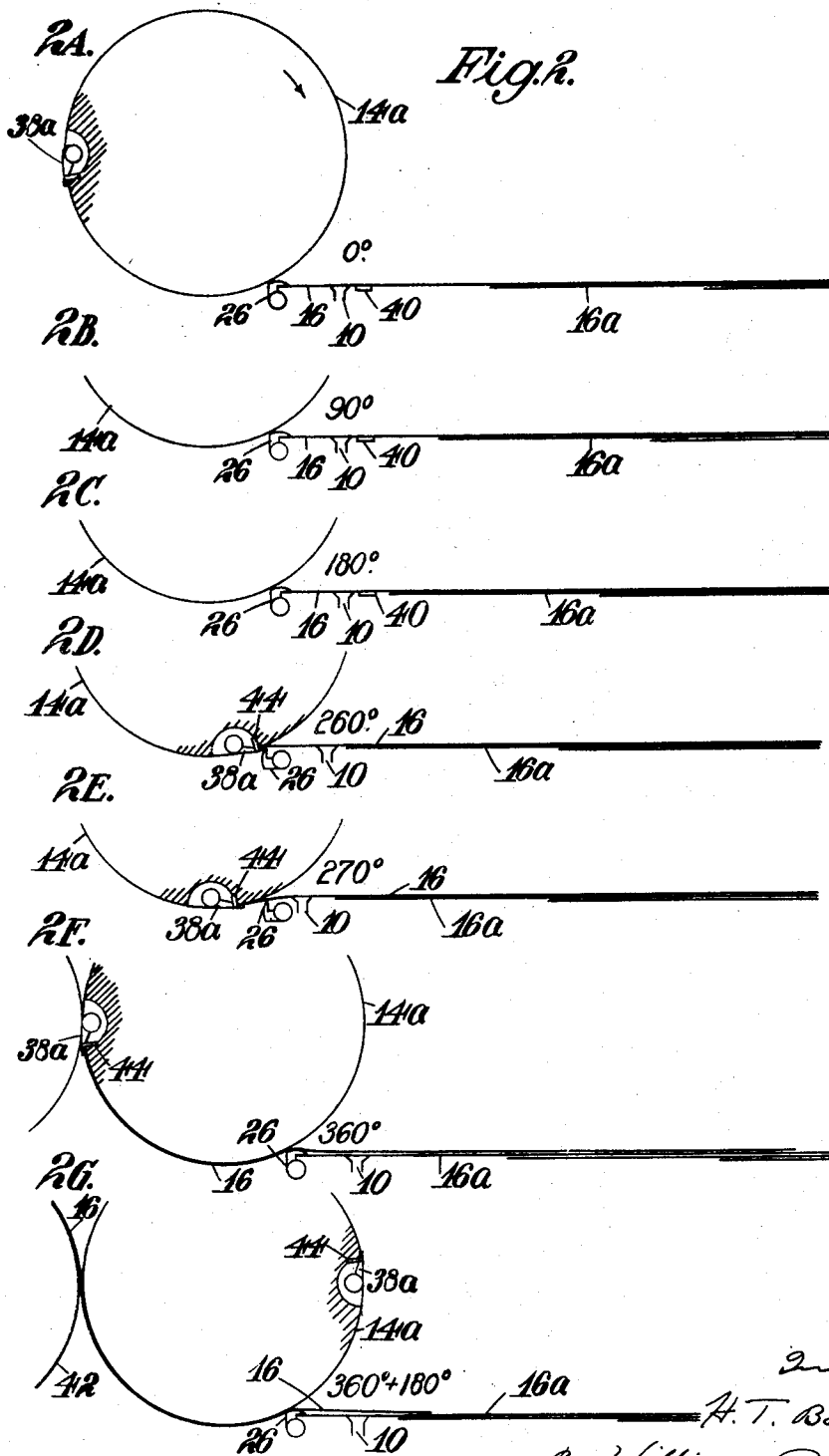
H. T. BACKHOUSE

2,642,282

MECHANISM FOR FEEDING SHEETS TO ROTARY DRUM MACHINES

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5 Sheets-Sheet 2



Inventor:

H. T. Backhouse

By William, Rich & Moore
Attys

June 16, 1953

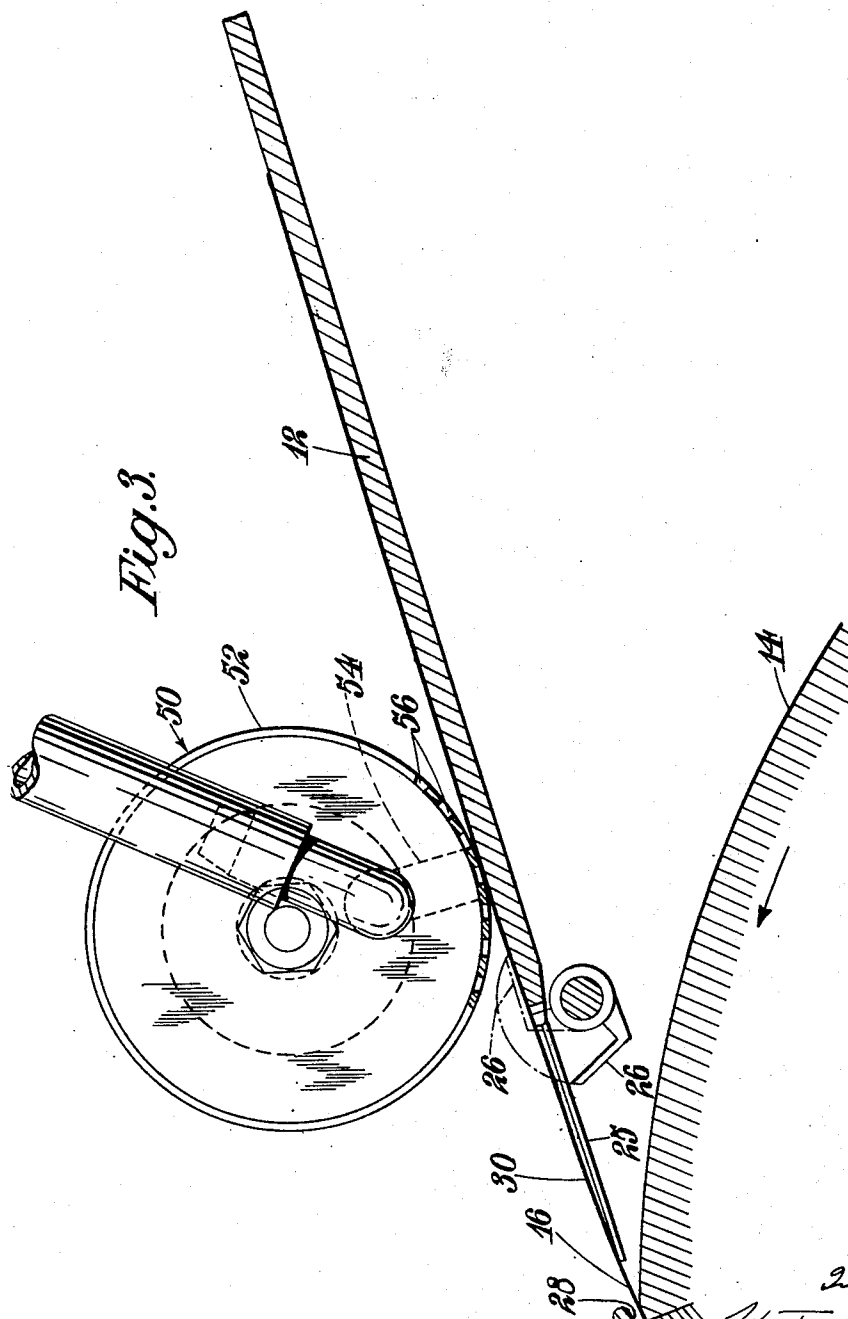
H. T. BACKHOUSE

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MECHANISM FOR FEEDING SHEETS TO ROTARY DRUM MACHINES

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5 Sheets-Sheet 3



Inventor:
H. T. Backhouse
By Williams, Rich & Inoué
Attorneys

June 16, 1953

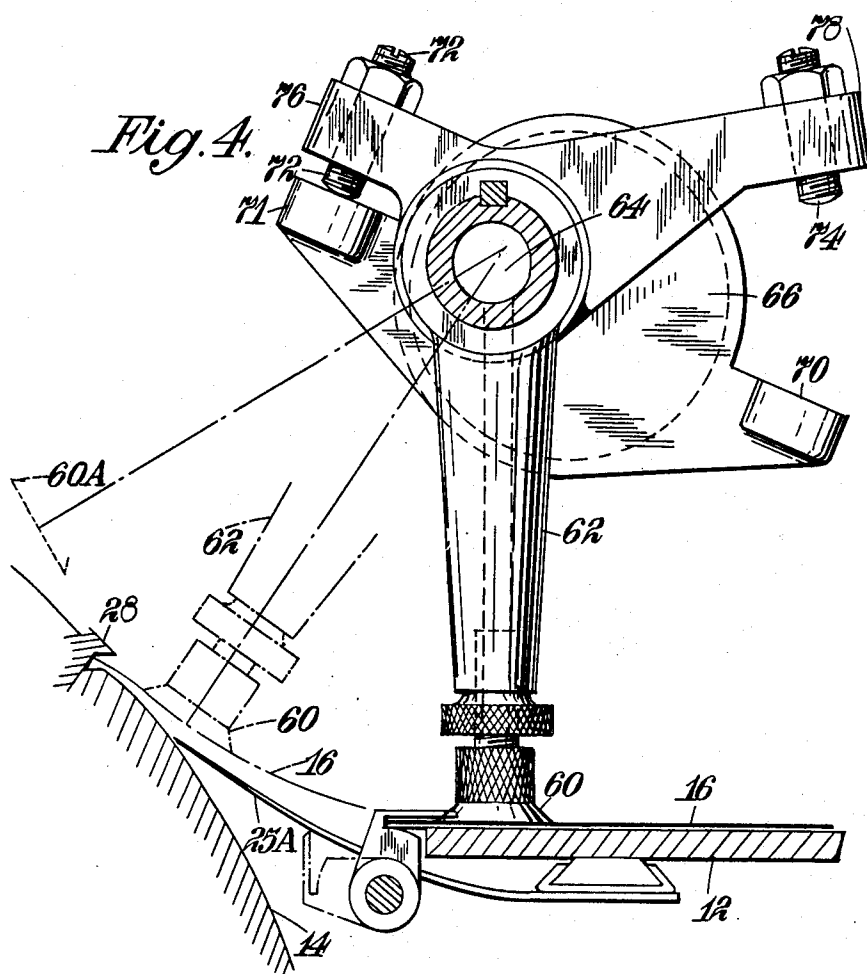
H. T. BACKHOUSE

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MECHANISM FOR FEEDING SHEETS TO ROTARY DRUM MACHINES

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5 Sheets-Sheet 4



Inventor:
H. T. Backhouse
By Williams, Rich & Moore
Attys.

June 16, 1953

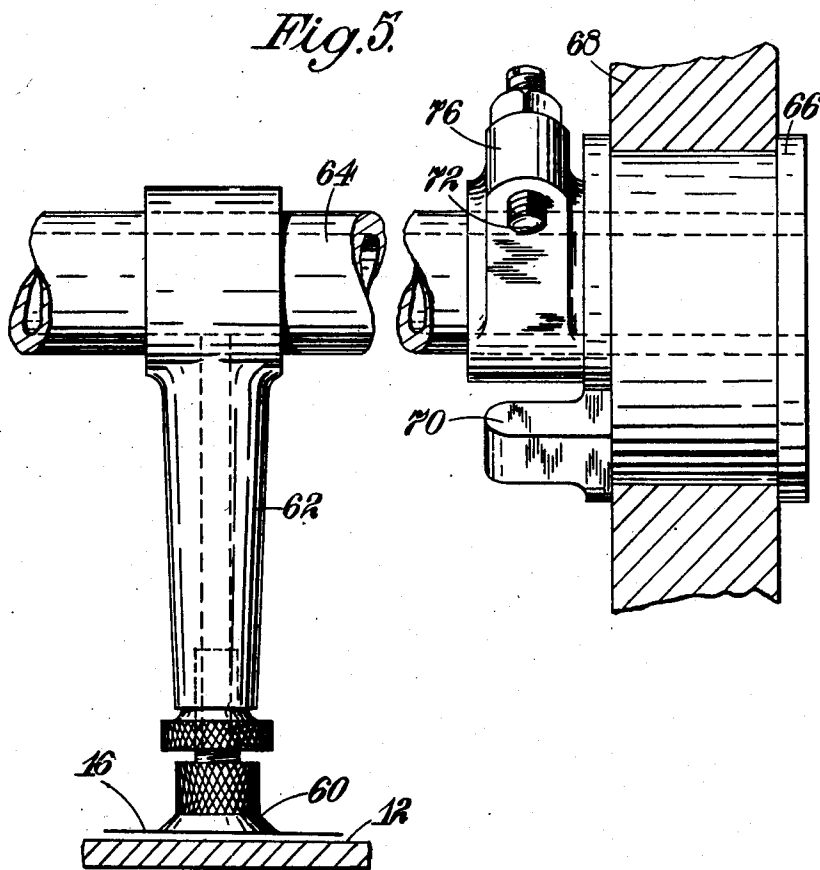
H. T. BACKHOUSE

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MECHANISM FOR FEEDING SHEETS TO ROTARY DRUM MACHINES

Filed Nov. 9, 1949

5 Sheets-Sheet 5



Inventor:
H. T. Backhouse
By William, Rich & Brown
Attys.

UNITED STATES PATENT OFFICE

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MECHANISM FOR FEEDING SHEETS TO
ROTARY DRUM MACHINESHeadley Townsend Backhouse, Sunningdale,
EnglandApplication November 9, 1949, Serial No. 126,265
In Great Britain November 12, 1948

4 Claims. (Cl. 271—53)

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The invention relates to a mechanism for transferring sheets of paper, card or the like, one by one from a layboard to grippers carried on a rotating drum, for example the drum of a rotary printing machine. It is an object of the invention to provide a simple and effective mechanism for this purpose.

The invention consists in a mechanism for transferring sheets of paper, card or the like one by one from a lay board to grippers carried on a rotating drum which mechanism comprises a suction gripper arranged to grip the sheet to be transferred and to feed the sheet, while so gripped, to the drum.

In a preferred form of the mechanism the suction gripper is arranged to engage the sheet intermediate in its length, e. g. a few inches from the front edge, and to feed the sheet into the drum grippers while moving at a slightly greater speed than the drum grippers so that the front edge of the sheet is positively pushed up to registering stops on the drum before release of the sheet by the suction gripper, any excess of movement of the portion of the sheet held by the suction gripper being accommodated by a slight buckling of the sheet between that portion and the front edge.

Three practical embodiments of the invention will now be described, by way of example of the invention, with reference to the accompanying drawings which are to some extent diagrammatic and in which:

Figure 1 is a side view illustrating the first embodiment,

Figure 2 is a diagram showing various stages in the cycle of operation of a machine incorporating, in a modified form, the embodiment shown in Figure 1,

Figure 3 is a side view showing the second embodiment,

Figure 4 is a side view showing the third embodiment, and

Figure 5 is a front view of the embodiment shown in Figure 4.

In the embodiment of the invention shown in Figure 1 there are several (i. e. two or more) suction grippers 10 spaced apart across the layboard 12 and each arranged for reciprocation on the underside of the layboard 12 towards or away from the drum 14 and to grip the underface of the sheet 16 to be transferred, during the movement of the gripper 10 towards the drum 14. In this embodiment each suction gripper 10 is reciprocated in guides 18 below the layboard 12 by means of an arm 20 on an oscillatory shaft

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22. The mouth of the gripper 10 is received within a slot 24 in the layboard 12 and is substantially level with the upper surface of the layboard 12. At the forward limit of its movement the suction gripper 10 lies just behind the front lays 26 which are constructed as described in my U. S. application Serial No. 62,251, filed November 26, 1948. The extent of movement of the suction gripper 10 is such as to give a small excess of movement of the sheet 16 to the drum 14 whereby the front edge of the sheet 16 is positively pushed, over a guide 25, into the gripper 28 on the drum 14 with, if necessary, a slight buckling of the sheet 16, as indicated at 30, to absorb the excess.

Figure 2 shows seven stages in the cycle of operations of a machine similar to that shown in Figure 1 but modified to the extent that the sheets are fed to the lower part of the drum instead of to the top of the drum. Figure 2A shows the first stage in the feeding of the sheet to the drum. The sheet 16 has arrived at the front lays 26 and registration of the front edge of the sheet 16 is effected during the rotation of the drum 14a through 90°, i. e. the drum 14a carrying the grippers 38a moves in a clockwise direction through 90° from the position shown in Figure 2A. The end of this stage in the cycle is illustrated in Figure 2B. It will be noticed that the second sheet 16a has advanced from the position shown in Figure 2A. When front registration has been effected the sheet 16 is gripped by suction sidelay mechanism 40 which, during the next 90° of rotation of the drum, draws the sheet 16 sideways up to a sidelay to effect side registration of the sheet 16. At the end of the second 90° of movement (illustrated in Figure 2C) the sidelay mechanism 40 releases the sheet 16 and the sheet is gripped on its underface by the suction grippers 10 which, during the next 90° of movement, feed the front edge of the sheet 16 into the grippers 38a of the drum. Figure 2D shows the position of the sheet after 80° of this movement, and Figure 2E shows the position at the end of the movement. It will be observed that the front lays 26 have been lowered out of the path of the edge of the sheet 16. During the next 90° of movement the sheet is partially withdrawn by the drum 14a, the front lays 26 are restored to their initial position and the suction grippers 10 are also returned to their starting position. It will be observed that a large portion of the sheet 16 remains on the layboard and that the front portion of the succeeding sheet 16a is still covered by the sheet

16. The leading edge of the sheet 16 is then transferred to grippers 38a on the impression drum 42, and a fresh cycle of operations begins. Figure 2G shows the position at the end of 180° of the second cycle. The rear portion of the sheet 16 is still overlying the leading portion of the next sheet 16a and front and side registration of the succeeding sheet is being effected in the manner already described, below the rear portion of the sheet 16. In this way adequate time is obtained for effecting the registration of the sheets, and the drum 14a may have a diameter which is less than that normally required for sheets of a corresponding size. It will be appreciated that in the arrangement just described the suction grippers 10 move at a speed which is greater than the peripheral speed of the drum 14a, and that to ensure that the edge of the sheet 16 is properly fed into the grippers 38a on the drum 14a the suction grippers 10 have a slight excess of movement which is taken up by a buckling of the sheet 16. The stop 44 on the drum 14a ensures that the front edge of the sheet 16 is properly located.

In the second embodiment of the invention shown in Figure 3 the suction gripper is constituted by a suction roller 50. The roller is of the type comprising a hollow shell 52 and means 54 for applying suction from the inside of the shell 52 successively to a series of radially extending holes 56 in the shell 52 in timed relation with the engagement of the outside of the shell 52 with the sheet 16 as the roller 50 rotates. The roller 50 is positioned over the layboard 12 adjacent to the front lays 26 and is arranged as it is rotated to engage the upper surface of each sheet 16 in turn and to push the sheet 16 towards and into the grippers 28 on the drum 14a.

In the third embodiment of the invention shown in Figures 4 and 5 there are several suction grippers 60 arranged above the layboard 12 and each carried on the lower end of a swinging arm 62. Each arm 62 is arranged for oscillation by a horizontal shaft 64 above and extending transversely to the layboard 12, forwardly from the position shown in which it is approximately perpendicular to the layboard 12 to move the suction gripper 60 towards the drum 14 and thereby to push the front edge of a sheet 16 carried by the gripper 60 over a guide 25A, against the drum 14 and into the drum grippers 28. The arm 62 starts from a condition of rest and accelerates rapidly to move the suction gripper 60, and the sheet 16, at a slightly greater speed than the drum gripper when the sheet 16 reaches the drum 14 so that the sheet 16 is positively pushed into the drum gripper. The suction gripper may be arranged, by means not shown, to be lifted clear of the sheet during the backward stroke of the arm and to be lowered onto the sheet at the beginning of the forward stroke to grip the sheet. After the sheet has been pushed into the drum gripper 28 the gripper releases the sheet 16, the arm 62 continues its movement for a short distance, with deceleration, to the position shown at 60A and then returns to the vertical position. Means are provided for lifting the gripper 60 clear of the sheet 16 during the return movement and for lowering the gripper 60 at the end thereof to grip the next sheet. These means are shown in Figures 4 and 5 and are arranged as follows. The shaft 64 is carried at its ends in eccentric bearings 66 (only one is shown) in the machine side frames 68. Each of these bearings has ears 70, 71 which are engaged by screws

72, 74 on arms 76, 78 secured to the shaft 64. As the shaft 64 approaches the limit of its rocking movement to move the gripper 60 to the position 60A, the screws 74 engage the ears 70 and further movement of the shaft rotates the bearings in the frame 68 thereby to lift the shaft 64 and grippers 60 away from the sheet 16 by reason of the eccentricity of the bearings. Similarly, as the grippers 60 return towards the starting position the screws 72 engage the ears 71 and rock the bearings to lower the gripper 60 onto the sheet 16.

It is not essential that, in the last described embodiment, the suction gripper 60 makes an arcuate movement. It may be given a rectilinear movement or a movement of varied curvature as best suited to the path required for the sheet and a cam control may be incorporated for that purpose.

Each of the above described embodiments shown in Figures 1, 3, 4 and 5, is applicable to a stream feeder or to a feeder of the kind in which the sheets arrive individually on the layboard.

When the machine is to handle sheets arriving individually the suction gripper employed in the invention may be positioned above or below the sheet whether the gripper be arranged for reciprocation, oscillation or continuous rotation according to the above examples.

I claim:

1. Mechanism for feeding sheets one at a time in registered relation to grippers and registering stops carried on a rotating drum, which mechanism comprises a feedboard onto which the sheets may be supplied in turn, front lays for locating at a registering position the front edge of each sheet on the feedboard in turn and arranged to be withdrawn below the feedboard to facilitate removal of the sheets, side lay mechanism for drawing successive sheets on the feedboard sideways and arranged for operation beneath the rear portion of a preceding sheet, at least one suction gripper arranged to grip the front portion of each sheet in turn at a location behind the front edge and after side registration has been effected, and means for operating the suction gripper to feed the front edge of the sheet while so gripped past the registering position and when the front lays are withdrawn to the grippers on the drum with a slight excess of movement accommodated by a slight buckling of the sheet between the gripper and the front edge of the sheet.

2. Mechanism for feeding sheets one at a time in registered relation to grippers and registering stops carried on a rotating drum, which mechanism comprises a feedboard onto which the sheets may be supplied in turn, front lays for locating at a registering position the front edge of each sheet on the feedboard in turn and arranged to be withdrawn below the feedboard to facilitate removal of the sheets, side lay mechanism for drawing successive sheets on the feedboard sideways and arranged for operation beneath the rear portion of a preceding sheet, at least one suction gripper operating from the underside of the sheets to grip each sheet in turn at a location in the front portion thereof spaced behind the front edge and after side registration has been effected, and means for reciprocating the suction gripper towards and away from the drum and arranged to move the gripper, while gripping the sheet, toward the rotating drum and in timed relation with the rotation thereof to

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feed the front edge of the sheet so gripped past the registering position while the front lays are withdrawn, to the grippers and stops on the drum at a speed slightly greater than that of the drum surface and with a slight excess of movement accommodated by slight buckling of the sheet between the suction gripper and the front edge and then to return the gripper after it has released the sheet to a position in which it is ready to engage the next sheet.

3. Mechanism for feeding sheets one at a time in registered relation to grippers and registering stops carried on a rotating drum, which mechanism comprises a feedboard onto which the sheets may be supplied in turn, front lays for locating at a registering position the front edge of each sheet on the feedboard in turn and arranged to be withdrawn below the feedboard to facilitate removal of the sheets, side lay mechanism for drawing successive sheets on the feedboard sideways and arranged for operation beneath the rear portion of a preceding sheet, at least one suction gripper operating above the sheets to grip each sheet in turn at a location in the front portion thereof spaced behind the front edge and after side registration has been effected, and means for oscillating the gripper towards and away from the drum arranged to

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move the gripper, while gripping the sheet, towards the rotating drum and in timed relation with the rotation thereof to feed the front edge of the sheet so gripped past the registering position while the front lays are withdrawn, to the grippers and stops on the drum at a speed slightly greater than that of the surface of the drum and with a slight excess of movement accommodated by slight buckling of the sheet between the suction gripper and the front edge and then to return the gripper after it has released the sheet to a position in which it is ready to engage the next sheet.

4. Mechanism as claimed in claim 3, in which the gripper and the means for oscillating the gripper are arranged to continue the forward movement of the gripper after it has released the sheet, before beginning the return movement.

HEADLEY TOWNSEND BACKHOUSE.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,087,997	Reinartz -----	July 27, 1937
2,248,079	Harrold et al. -----	July 8, 1941
2,328,943	Backhouse -----	Sept. 7, 1943
2,395,444	Belluche -----	Feb. 26, 1946