Sept. 23, 1941. A. P. BATTEY ET AL 2,256,823

FLUID OPERATED SIDE LAY

Filed Oct. 12, 1940 2 Sheets-Sheet 1

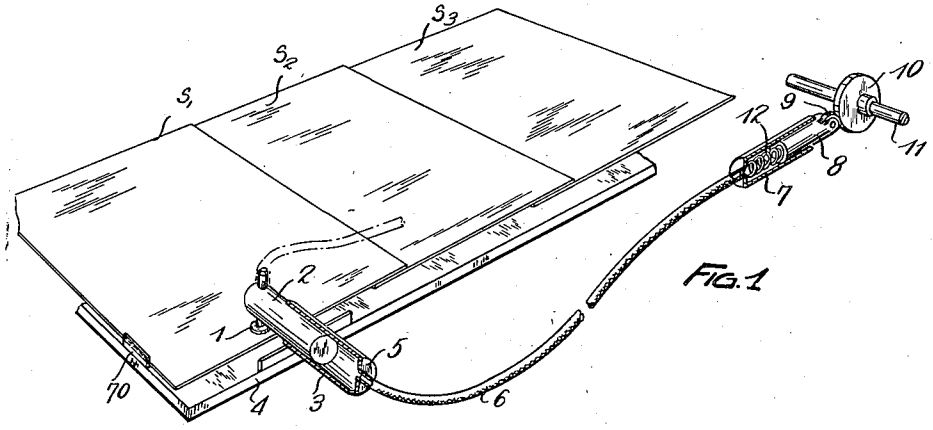


FIG. 1

HYDRAULIC PRESSURE IN 6 AND SUCTION IN 18 ALTERNATE

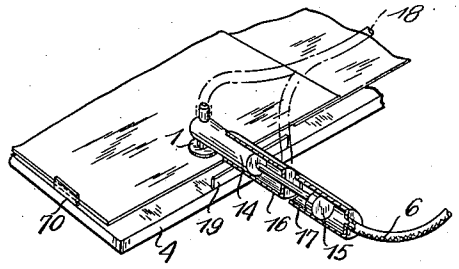


FIG. 2

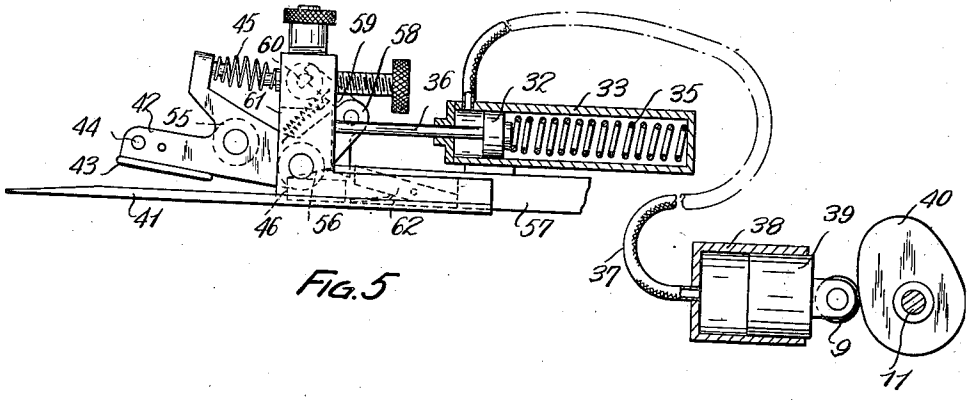


FIG. 5

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FLUID OPERATED SIDE LAY

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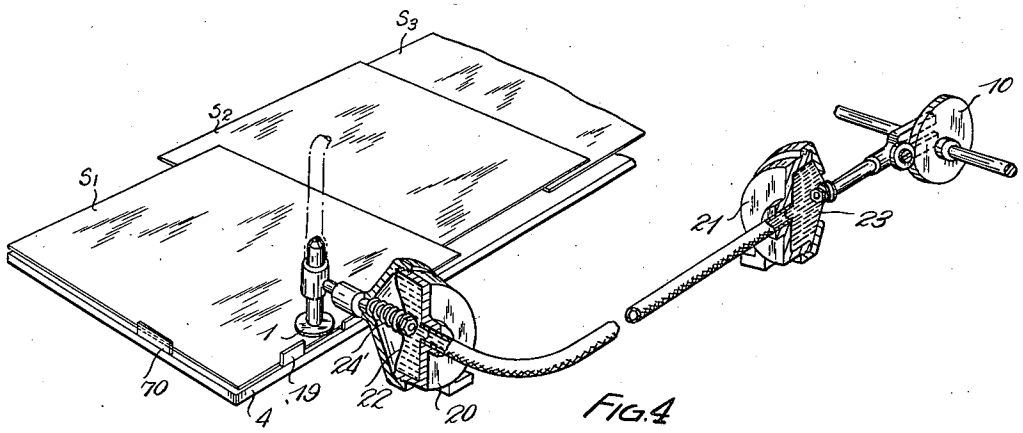


FIG. 4

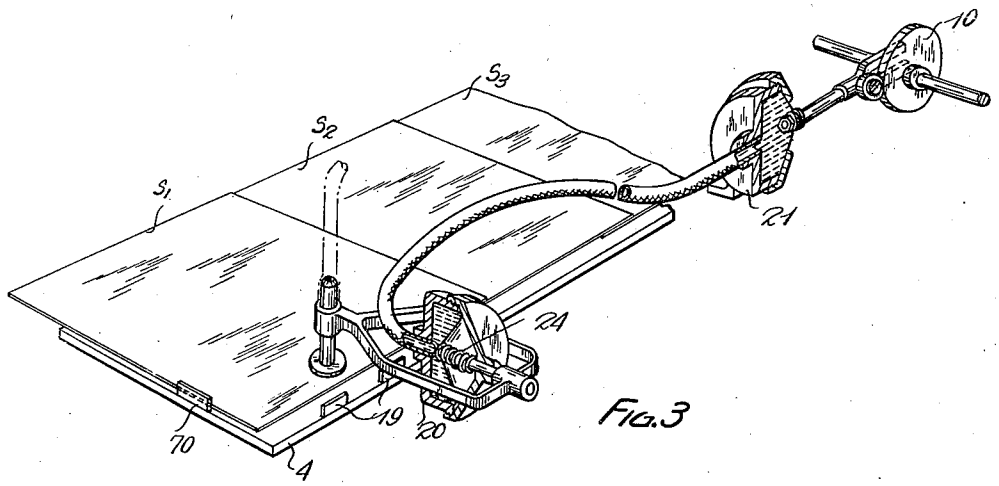


FIG. 3

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UNITED STATES PATENT OFFICE

2,256,823

FLUID OPERATED SIDE LAY

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Application October 12, 1940, Serial No. 360,978
In Great Britain July 3, 1939

6 Claims. (Cl. 271—58)

The invention relates to improvements in fluid operated side-lays, and has reference to side-lay mechanisms for sheet feeding machines, that is machines for feeding sheets of papers to printing presses or the like, wherein are utilized sheet gripping means which are caused to shift laterally at the proper times for drawing each sheet against a side-lay stop or guide for the purpose of side registration.

One of the objects of the invention is the provision of improved means for effecting the movements of the aforesaid sheet gripper.

Another object is the provision of mechanism of this character which shall facilitate adjustments of the gripper position.

A further object is the provision of flexible connections for applying force through a column of fluid to bring about the desired movements of the gripper.

Other objects and features of novelty will appear as we proceed with the description of different embodiments of the invention, which for the purposes of the present application, we have illustrated in the accompanying drawings.

The means for moving the gripper may be so constructed and arranged that the gripper is moved in one direction directly by the fluid and in the other direction by other means such as suction, or such as spring means energized by the fluid pressure.

If desired, suction from the same source may be employed both for gripping the sheets and for moving the gripper in one direction, the movement of the gripper in the other direction being effected directly by the variations in the fluid pressure.

In one form of the invention the means for applying varying pressures to the fluid comprise a piston and cylinder or the equivalent (e. g. a diaphragm and casing) of which the cylinder is in connection with the pipe, the piston and cylinder being relatively movable by means of a cam, crank, eccentric or the equivalent driven in timed relationship with the feeding machine.

Some specific embodiments of the invention and some modifications thereof will now be described by way of example and with reference to the accompanying drawings which are all purely diagrammatic and in which:

Fig. 1 is a perspective view showing an embodiment of the invention;

Figs. 2 to 4 are perspective views showing modifications in the embodiment shown in Fig. 1, and

Fig. 5 is a side view showing a second embodiment of the invention.

Like reference numerals indicate like parts in the several figures of the drawings.

In one embodiment of the invention shown in Figure 1 the gripper is a sucker 1 carried on a piston 2 operating in a cylinder 3 mounted above one edge of the feed board 4 of a printing press, the axis of the cylinder extending transversely of the feed board. The cylinder is closed at one end 5 and is connected by means of a flexible pipe 6 to a second cylinder 7 containing a second piston 8 which carries a roller 9 serving as a follower for a cam 10 mounted on a shaft 11 forming part of the driving mechanism for the sheet feeding machine. The second cylinder, 7, contains a spring 12 engaging the piston 8 and arranged to tend to maintain the roller in contact with the cam. Both cylinders and the pipe are filled with a liquid such as oil or water and the arrangement is such that as the cam is rotated the piston carrying the roller is reciprocated in its cylinder causing variations in the pressure of the liquid which are transmitted to the other cylinder causing the piston in that cylinder with its associated gripper to reciprocate in a direction across the feed board.

In the modification of the form of the invention just described and illustrated in Figure 2 suction is employed to effect, or to assist in effecting, the movements of the sucker 1 in one direction. In this modification there are two pistons 14 and 15, and two cylinders 16 and 17 arranged in tandem at the edge of the feed board 4, the sucker being attached to the piston 14. The cylinder 16 is connected to the same source of suction as is the sucker by means of a pipe 18 and the cylinder 17 contains liquid and is connected to the flexible pipe 6 and thence to another cylinder such as the cylinder 7 described above. With this arrangement the sucker is moved away from the stop 19 by liquid pressure operating on the piston 15 in the liquid-containing cylinder and in the opposite direction (i. e. towards the stop) at least in part by the action of the suction in the cylinder 16. A single control valve (not shown) is employed for the suction applied to the sucker and to the cylinder, the valve being driven in timed relationship with the sheet feeding machine and it will be understood that with this arrangement the full effect of the suction is not applied to the cylinder until the sucker mouth has been closed by a sheet so that movement of the sucker may be delayed, or at least

the rate of movement reduced, until a sheet has been gripped.

Figures 3 and 4 show two further modified forms of the device shown in Figure 1. In both these modifications the pistons 2 and 8 and their associated cylinders 3 and 7 are replaced by casings 20, 21 and flexible diaphragms 22, 23. In the construction shown in Figure 3 the arrangement is such that the sucker 1 is moved positively in the direction towards the stop 19 by the liquid pressure and is returned by means of the spring 24, the arrangement having the advantage over that shown in Figure 4 in that the registering stroke of the sucker is effected under positive control whereas in the Figure 4 construction the registering movement of the sucker is effected by the spring 24' and the return movement is effected positively by the liquid pressure.

In another specific form of the invention illustrated in Figure 5 a mechanical sheet gripper is employed. The reciprocatory movements of the gripper are effected by means of a piston 32 in a fixed cylinder 33 and connected by a piston rod 36 to the reciprocatory portion of the gripper. One end of the cylinder is, as in the previous examples, connected by means of a flexible, liquid-containing pipe 37 to a cylinder 38 having a piston 39 arranged as described above for movement by a cam 10. In this case the return movements of the piston 32 and associated parts of the gripper are effected by a spring 35 inside the cylinder 33.

In this modification the gripper itself is a mechanical one, and while the details of its construction and operation form no part of the present invention, we will describe it with sufficient particularity to enable the reader to understand its operation. The structure comprises a lower tongue 41 and a pivoted arm 42. The arm 42 carries a pressure pad 43 hinged at 44 to arm 42, and the sheet is engaged between the opposed faces of this pad and the tongue 41 under the pressure of a spring 45. The side-lay stop or guide against which the sheet is to be drawn by the gripper is illustrated at 46.

The gripper members 41 and 42 are separated towards the end of the operative movement of the gripper by the engagement of a roller 55, which is carried on arm 42, with an inclined ramp 56 formed on a stationary member 57. The arm 42 carries on a rearwardly directed extension 58, a pivoted latch 59 arranged to engage a locking pin 60 when the arm 42 has been raised to open position. The locking pin 60 is carried on an upright 61 which is secured to and moves with tongue 41, the reciprocation of these parts being effected by piston rod 36. The stationary member 57 carries a pivoted pawl 62 which is spring pressed upwardly into the position shown in the figure, where it will engage the lower end of the latch 59.

In the operation of this mechanism the gripper is maintained in the open position during its movement away from the side-lay by the engagement of the latch 59 with the locking pin 60, the latch sliding over and depressing the pawl 62. The figure shows the gripper open and at the end of its movement away from the side-lay stop 46. At the beginning of the return movement of the gripper the latch 59 is engaged by the pawl 62 and is released from the pin 60, allowing the gripper to close onto and grip the sheet under the action of the spring 45. The gripper remains closed until the roller 55 engages the ramp 56, which is arranged to occur as soon as the edge of the sheet has reached the side-lay stop. Further movement of the gripper results in its opening under the action of the roller 55 and ramp 56 and the engagement of the latch 59 with the stop 60 to relock the gripper in the open position.

Our invention finds utility especially in machines for feeding sheets in lapped formation, usually termed "stream feeding." In the drawings we have shown three such sheets, S_1, S_2, S_3, although as is well understood a stream may be made up of as many as five or six sheets. The first sheet S_1 as it moves down the feed board strikes one or more front stops 70, and the sucker 1 is so timed as to grip the sheet immediately after it settles against the front stop.

In all the constructions described above the gripper and the associated means for moving it may be mounted above the feed board by means which allow of adjustment of the position of the gripper either in the direction of feed of the sheets or transversely to that direction or in both directions and it will be appreciated that the particular form of the drive to the gripper moving means employing a flexible pipe facilitates the adjustment of the position of the gripper.

While we have described more or less in detail certain particular embodiments of the invention, we desire it to be understood that such detailed disclosure is for the purpose primarily of complying with the requirements of the statute, and is not to be construed as limiting the invention except as specified in the appended claims.

Having thus described our invention, we claim:

1. In a sheet feeding machine, a feed board, a side-lay stop, a sheet gripper for gripping a sheet and shifting it sidewise into engagement with said side-lay stop, and means for moving said gripper sidewise comprising a pressure chamber with a movable wall, an operative connection between said movable wall and said gripper, and a closed liquid-containing conduit in communication with said pressure chamber, means for applying pressure periodically to the fluid at the opposite end of said conduit to shift said movable wall in one direction, the opposite side of said wall being exposed to force tending to return said movable wall and said gripper when said pressure is relieved.

2. In a sheet feeding machine, a feed board, a side-lay stop, a sheet gripper for gripping a sheet and shifting it sidewise into engagement with said side-lay stop, and means for moving said gripper sidewise comprising a pressure chamber with a movable wall, an operative connection between said movable wall and said gripper, a flexible liquid-containing conduit in communication with said pressure chamber, means for applying pressure periodically to the liquid at the opposite end of said conduit to shift said movable wall in one direction, the opposite side of said wall being exposed to force tending to return said movable wall and said gripper when said pressure is relieved.

3. In a sheet feeding machine, a feed board, a side-lay stop, a sheet gripper for gripping a sheet and shifting it sidewise into engagement with said side-lay stop, and means for moving said gripper sidewise comprising a pressure chamber with a movable wall, means for connecting said wall to said gripper, a second pressure chamber remote from said first chamber, a movable wall in said second chamber, a conduit filled with liquid

connecting said chambers, means for periodically moving said second chamber wall in timed relation to the movements of the machine, the opposite side of said wall being exposed to force tending to move said first named chamber wall whenever the pressure acting against the second named chamber wall is relieved.

4. In a sheet feeding machine, a feed board, a side-lay stop, a sheet gripper for gripping a sheet and shifting it sidewise into engagement with said side-lay stop, and means for moving said gripper sidewise comprising a pressure chamber with a movable wall, means connecting said wall to said gripper, a second pressure chamber remote from said first chamber, a movable wall in said second chamber, a conduit filled with liquid connecting said chambers, cam means for moving said second chamber wall and through the column of liquid for moving said first named chamber wall, the opposite side of said wall being exposed to force tending to move said first named chamber wall in the opposite direction whenever the movements of the second named chamber wall permit.

5. In a sheet feeding machine, a feed board, a side-lay stop, a suction gripper for gripping a sheet and shifting it sidewise into engagement with said side-lay stop, hydraulic means for moving said gripper away from said side-lay stop periodically in timed relation to the machine movements, and suction means for moving the gripper toward said side-lay stop alternating with the action of said hydraulic means.

6. In a sheet feeding machine, a feed board, a side-lay stop, a suction gripper for gripping a sheet and shifting it sidewise into engagement with said side-lay stop, hydraulic means for moving said gripper away from said side-lay stop periodically in timed relation to the machine movements, and suction means for moving the gripper toward said side-lay stop alternating with the action of said hydraulic means, said gripper and said suction means having a common connection to a suction controlling means, whereby the action of the gripper to side register the sheet is dependent upon the sheet first being gripped.

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