Jan. 13, 1970 J. C. ACKERMAN 3,489,407

FEEDER AIR GLIDE BAR

Filed Sept. 21, 1967 2 Sheets-Sheet 1

Fig. 1.

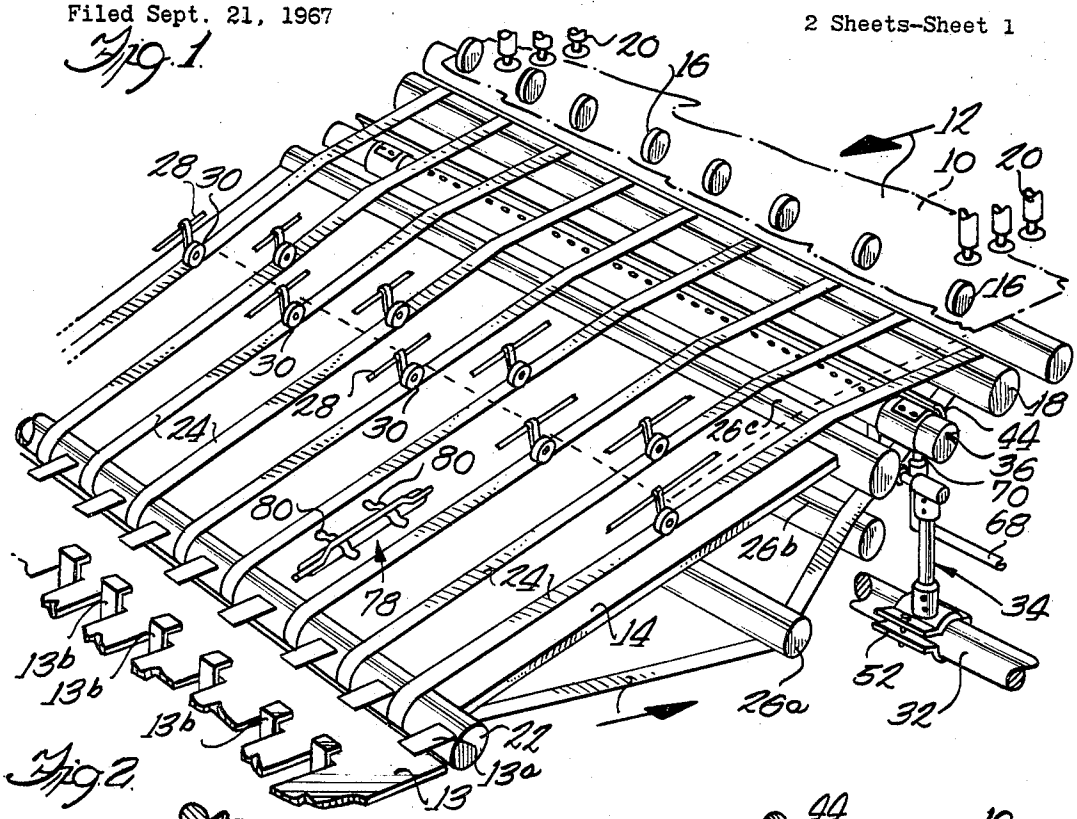


Fig. 2.

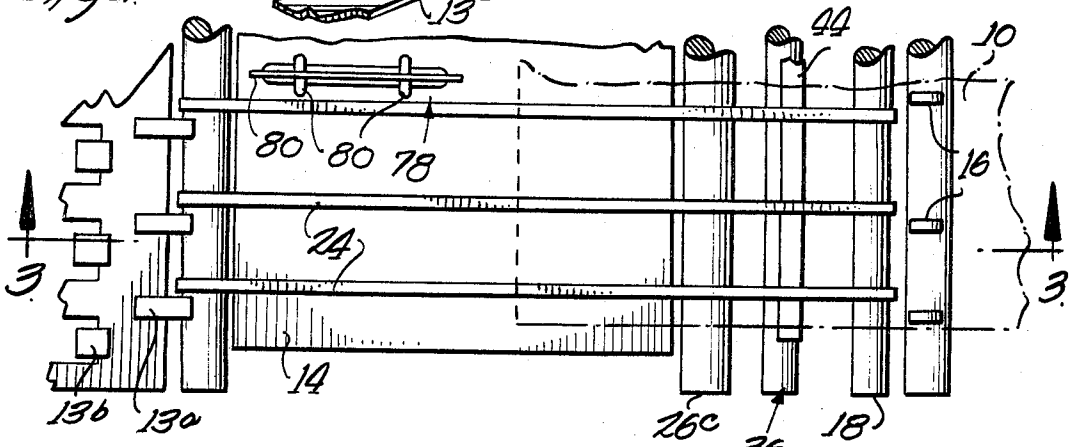
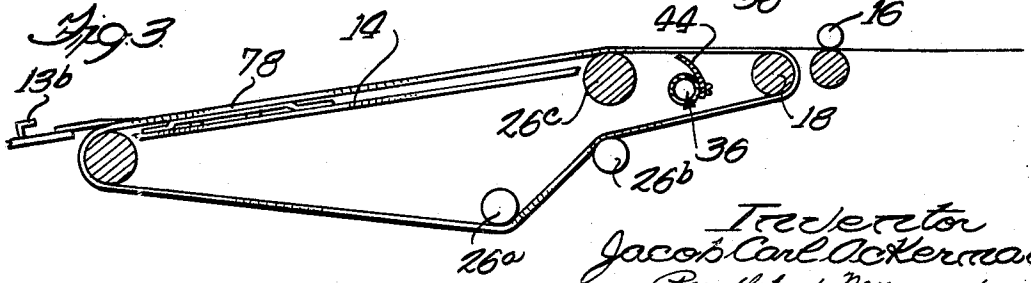


Fig. 3



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Jan. 13, 1970 J. C. ACKERMAN 3,489,407

FEEDER AIR GLIDE BAR

Filed Sept. 21, 1967 2 Sheets-Sheet 2

Fig. 4.

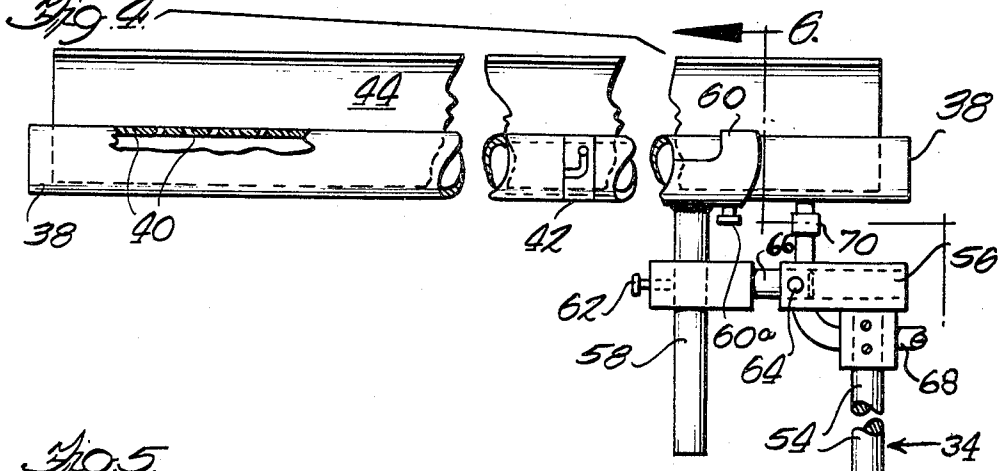


Fig. 5.

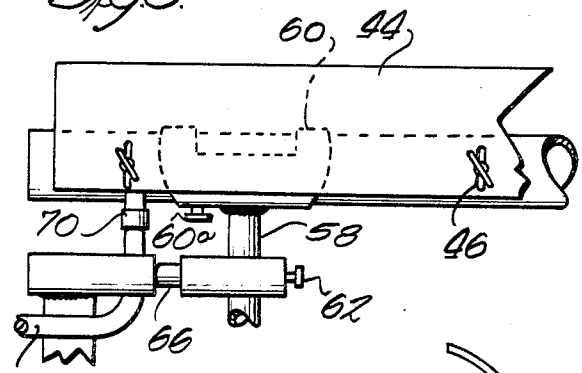


Fig. 6.

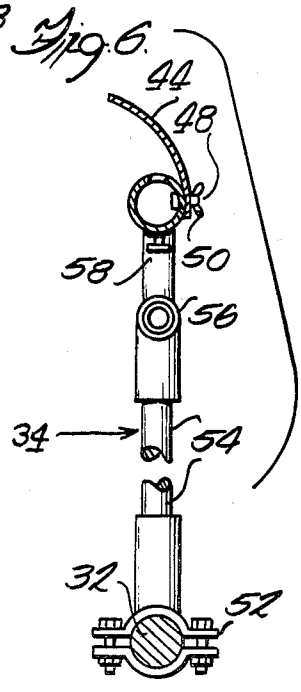
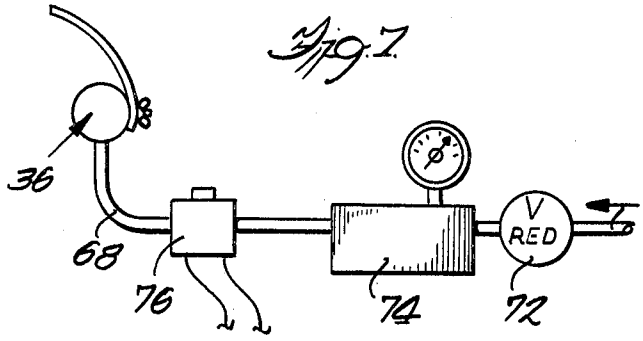


Fig. 7.



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FEEDER AIR GLIDE BAR

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Int. Cl. B65h *5/02, 29/24;* B65g *31/00*
U.S. Cl. 271—45 6 Claims

ABSTRACT OF THE DISCLOSURE

This invention relates to an improvement in paper sheet feeder devices having a plurality of conveyor tapes which advance sheets of paper over a feeder table. More particularly, it relates to the disposition of an air dispersing conduit at the input end of the feeder table to provide a forwardly moving sheet of air beneath the paper sheets and along the length of the feeder table.

BACKGROUND OF THE INVENTION

In paper sheet feeder devices currently in use, a stock pile of sheets to be printed is ordinarily arranged at the rear end of a feeder table. The sheets are lifted, one at a time, from the top of the pile by vacuum nozzles. As each sheet is lifted, air blast nozzles at the rear of the stock pile provide a cushion of air beneath the sheet while the vacuum nozzles apply tension to it. In such tensioned, suspended state, each sheet is fed between forwarder rollers and tape conveyor rollers located at the rear end of the feeder table. From the rollers the sheets are conveyed on tapes passing over the tape conveyor rollers along the length of the feeder table to a register table where they are aligned by front edge guide bars ("front guides") for entry into the press mechanism.

As the sheets traverse the feeder table en route to the register table they are held against the tapes by means of one or more heavy steel hold-down rollers which depend from hold-down rods above the tapes.

Substantial difficulty has been encountered, however, in feeding the sheets smoothly along the feeder table into the front guides on the register table. Although the air cushion provided by the air blast nozzles at the rear of the stock pile initially faciliates movement of the sheets beneath the forwarder rollers, that cushion soon dissipates. The sheets are then conveyed down the length of the feeder tables by the forward motion of the tapes moving beneath the steel rollers on the hold-down rods. Apparently due to the intervention of frictional forces and static electricity, the sheets often become so misaligned while on the feeder table that when they arrive at the front end of that table proper alignment is not automatically possible and smooth, continuous operation of the feeder mechanism must be interrupted.

Moreover, even if the sheets maintain regular alignment as they travel along the feeder table, the static electricity which they pick up there frequently causes them to cling together or onto the register table. The sheets thus become misaligned as the feeder mechanism attempts to introduce them evenly and one by one into the front guides. When such misalignment and adherence occur, stoppage or slowdown of the feeding process results, or sheets may even be run through the press back to back.

A further substantial difficulty has been encountered when the feeder device is used to handle sheets of paper which have become wavy as a result of such conditions as variation in the moisture content of the stock or improper storage of the stock. Even though such sheets enter the front guides on the register table with straight front edges, as a result of the action of straightening devices positioned below the register table, the body and trailing edges remain wavy. The result is that the sheets become wrinkled as they travel through the press and must be rejected. To combat waviness, a fillet, commonly called a "bustle," is fixed to the top surface of the feeder table to raise drooping portions of the trailing edge of each sheet to a position which is even with the rest of the rear edge. Such an expedient temporarily achieves horizontally even rear edges of the sheets, but the stock pile is rarely uniform. The "bustle" must be changed often, thus causing frequent shutdowns of the feeding process and lost time in the printing operation.

SUMMARY OF THE INVENTION

The present invention is directed to introducing a sheet of air beneath the paper sheets adjacent their point of entry onto the conveyor tapes travelling over the feeder table. The sheet of air thus introduced supplements air from the air blast nozzles at the rear of the stock pile and travels along the length of the surface of the feeder table. The sheets are supported by the supplementing sheet of air as well as by the tapes en route to the register table. This results in an even, regular alignment of the sheets while they travel over the feeder table, and it overcomes the effects of static electricity on the sheets at the register table. Such a sheet of supplementing air, furthermore, smooths rippled or wrinkled stock at the forward end of the feeder table and elminiates the need for the expedient of a "bustle."

Accordingly, it is one of the objects of the present invention to provide apparatus for directing a sheet of impelled air upon and along the length of the surface of the table to assist the forward movement of paper sheets thereon.

Another object of the invention is to provide an air dispersing conduit for actively and evenly distributing a sheet of impelled air upon and along the length of the surface of the feeder table.

A further object of the invention is to obtain a flow of air over the surface of the table supplementing an air cushion from air blast nozzles located at the rear of a stock pile of paper sheets.

A further object of the invention is to provide a flow of air over the length of the surface of a feeder table to counteract frictional and static electricity forces which interfere with the orderly progress of paper sheets along the conveyor tapes traversing the feeder table.

Thus, in a paper sheet feeder device having a sheet feeder table, a front tape roller adjacent the front end of the table, a plurality of intermediate tape rollers opposite the front roller and adjacent the rear end of the table, a rear tape roller spaced from the rear end of the table adjacent the intermediate tape rollers, and a plurality of continuous paper sheet conveyor tapes mounted on the rollers movable in a forward direction over the table toward said front end, an air dispersing conduit is provided adjacent the rear end of the table, which conduit includes a plurality of air jet ports for directing a sheet of impelled air upon and along the length of the surface of the table.

DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will be apparent from an examination of the following detailed specification, and of the accompanying drawings, in which:

FIGURE 1 is a view in perspective of a portion of a paper sheet feeder device;

FIG. 2 is a partial top plan view;

FIG. 3 is a sectional view of the apparatus taken along line 3—3 in FIG. 2;

FIG. 4 is an enlarged front elevation view partially broken away of a portion of the apparatus shown in FIG. 1;

FIG. 5 is a rear elevation view;

FIG. 6 is a sectional view taken along the line 6—6 in FIG. 4; and

FIG. 7 is a diagrammatic view.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1, a sheet of paper **10**, shown in dotted lines, is shown being advanced in the direction of arrow **12** toward a register table **13** of a printing press over a feeder table **14** in a sheet feeder device. The sheet **10** has been lifted into position and started between forwarder rollers **16** and a rear tape conveyor roller **18** by vacuum nozzles **20**. A front tape conveyor roller **22** is disposed at the forward end of the feeder table **14**. Conveyor tapes **24** move in a forward direction over the surface of the table to carry the paper sheet up to the register table onto the latter table over bridges **13***a* and into front guide bars **13***b*. Intermediate conveyor tape rollers **26***a*, **26***b* and **26***c* (see FIG. 3) are provided in the feeder apparatus to maintain appropriate tension on the conveyor tapes and positioned to provide a slight downward slope toward the front of the feeder table, thus keeping the tapes in motion and assisting sheet **10** over the table. Above the tapes, hold-down rods **28** are arranged to suspend hold-down rollers **30** over the table to keep sheet **10** in contact with the tapes.

Attached to a stationary shaft **32** is a support bracket **34** for maintaining an air glide bar **36** adjacent the rear end of the feeder table. The air glide bar includes an air dispersing conduit **38** having a plurality of air jet ports **40** along the length thereof. As shown in FIG. 4, the air jet ports are angularly positioned with respect to each other through the upper surface of conduit **38** so that air forced through the ports will be impelled upward past the conveyor tapes. When the air conduit is adapted for use in a wide feeder mechanism handling wide sheets of paper, it may be assembled in lengths having a sealing, twist-lock engagement, such as lock **42**, which will permit air passage through the entire length of the conduit assembly.

Along the rear of the conduit a curved deflector plate **44** is attached to extend over the jet ports **40**. The streams of impelled air issuing from the jet ports are thus deflected and directed over the surface of the feeder table. It has been found desirable that the deflector plate be adjustably attached to conduit **38** so that the deflector may be positioned immediately beneath the conveyor tapes. Thus, vertical slots **46** are provided in the lower edge of the deflector to fit over studs **48** affixed to the conduit, thereby permitting the deflector to be locked in position when wing nuts **50** are secured.

As shown in the drawings, a support bracket **34** is provided, preferably at each end of the air glide bar. A clamp **52** is attached to the stationary shaft **32**. Attached to the clamp is a short shaft **54** onto which a swivel head **56** is mounted to receive, in turn, the body of a yoke **58**. A sleeve **60** attached to the yoke is adapted to slide over the end of the air conduit **38** and clamped onto the conduit by means of set screw **50***a*, without blocking the air jet ports **40**. The body of yoke **58** may be raised or lowered from the swivel head by means of set screw **62**, thus providing means for raising or lowering the air glide bar. Also, the bar may be moved in a horizontal arc and clamped in position by means of set screw **64** which impinges upon the pivot rod **66**. The air glide bar may thereby be inserted alongside the intermediate roller **26***c* between the upper and lower portions of conveyor tapes **24** to direct a sheet of impelled air over the feeder table.

When the air glide bar **36** has been positioned in the feeder, as above described, compressed air may be introduced into the bar through a hose **68** attached to coupling **70** at one end of conduit **38**. Hose **68** may be connected to conduit **38** from an independent source of compressed air (not shown) regulated by an adjustable reducing valve **72** (see FIG. 7), an air cushion tank **74** (for maintaining constant pressure) and a solenoid-operated shutoff valve **76**. In the event that the source of compressed air is one of the tanks of a printing press to which the feeder is engaged, the valve **76** may be omitted, since the air pressure will cease when the press is turned off.

In operation, an air glide bar as above described, which may be about 74" long, will receive air under pressure normally in the range of 0.5 to 15.0 p.s.i., depending upon the weight of the paper stock to be printed. This pressure will be sufficient, if the jet ports **40** are spaced 1" apart and are approximately 0.036" in diameter, to cause the air to be deflected on the deflector plate **44** and travel along the length of a feeder table which is on the order of 85" wide and 51" long. As the sheets of paper to be printed are fed over such a table, the air issuing from the bar will form an active sheet beneath and around the conveyor tapes which will carry the paper smoothly onto the register table and into front guides **13***b*. It is thus unnecessary to attempt to force the rear air blast nozzles in the feeder beyond their capacity and normal function, and the sheets of paper inserted in the feeder will be cushioned on the air from the glide bar as it travels on the conveyor tapes.

In the past, if wavy sheets of paper stock were fed over the feeder table, it was necessary to even out the rear edges of such sheets before the sheets were introduced into the press. A fillet, commonly called a "bustle," was positioned on the feed board adjacent the front tape conveyor roller to cause drooping portions of the rear edges of the sheets to be lifted into a straight horizontal line. Such a fillet **78**, a metal bar approximately 1½" wide and 24" long, is shown affixed to the feeder table **14** with tapes **80**. When the air glide bar **36** is in operation, however, it is unnecessary to adopt the use of fillet **78**, since the sheet of supplementing air provided by bar **36** will float out the rear edges of the paper sheets evenly before they pass the register table.

While a particular embodiment of this invention is shown above, it will be understood, of course, that the invention is not limited thereto, since many modifications may be made, and it is contemplated, therefore, by the appended claims, to cover any such modifications as fall within the true spirit and scope of this invention.

I claim:

1. In a paper sheet feeder device of the type having a sheet feeder table and a register table, a front tape roller adjacent the front end of the feeder table, a plurality of intermediate tape rollers opposite the front roller adjacent the rear end of the feeder table, said feeder table extending at least most of the distance between the intermediate and front rollers, a rear tape roller spaced from the rear end of the feeder table adjacent the intermediate tape rollers, and a plurality of continuous paper sheet conveyor tapes mounted on the rollers movable in a forward direction over the feeder table toward said front end, the improvement comprising an air conduit disposed adjacent and along substantially the entire width of the rear end of the feeder table, said conduit including a plurality of air jet ports spaced close to each other and along substantially the entire width of the rear end of the feeder table for providing and directing a sheet of impelled air upon and along the length of the surface of the feeder table.

2. The improvement of claim **1** in which the air conduit is disposed between the intermediate rollers and the rear roller.

3. The improvement of claim **1** in which the conduit includes an air deflector plate over the air jet ports for diffusing and directing the impelled air from the ports along the feeder table.

4. The improvement of claim **1** in which the conduit includes an air deflector plate on the conduit adjacent the

air jet ports for diffusing and directing the impelled air from the air jet ports along the feeder table, the air jet ports being directed at varied angles in relation to each other toward the deflector.

5. The improvement of claim **1** in which the conduit includes adjustable mounting supports connecting said conduit in releasable variable engagement to the feeder frame.

6. The method of feeding paper sheets to be printed over a feeder table in a paper sheet feeding device which comprises introducing a sheet of air under pressure adjacent the input end of the feeder table and directing said sheet of air between the paper sheets and substantially the entire surface of the table along the length of the table to the output end thereof.

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U.S. Cl. X.R.

198—190; 214—1