March 12, 1963 J. R. SPOONER ETAL 3,081,082

SHEET CONTROL FOR PRINTING MACHINES

Filed Dec. 14, 1959

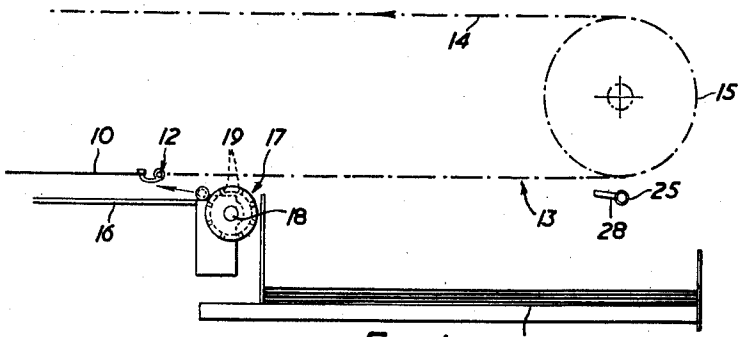


FIG. 1.

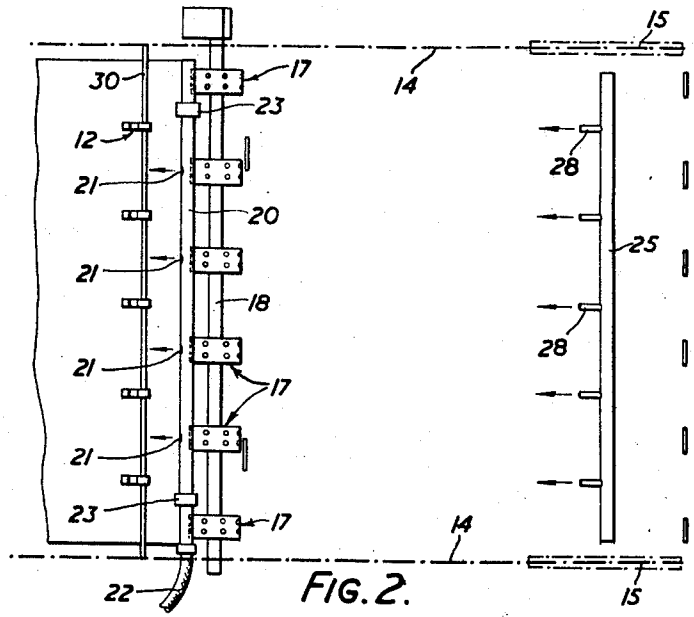


FIG. 2.

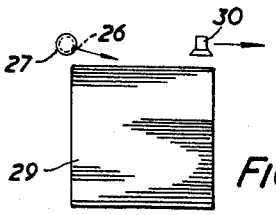


FIG. 3.

INVENTORS

Joseph R. Spooner
William A. Hadley

BY

Morrison, Kennedy & Campbell

ATTORNEYS

United States Patent Office 3,081,082
Patented Mar. 12, 1963

3,081,082

SHEET CONTROL FOR PRINTING MACHINES

Joseph R. Spooner, Audenshaw, England, and William Alfred Hadley, Tappan, N.Y., assignors to Linotype and Machinery Limited, London, England, a company of Great Britain

Filed Dec. 14, 1959, Ser. No. 859,384
Claims priority, application Great Britain Dec. 15, 1958
6 Claims. (Cl. 271—68)

This invention relates to a method and means for controlling the movement of a sheet in its feed to or delivery from a sheet-fed printing machine.

The invention is directed to affording an improved control for the sheet in a direction normal to the plane of the sheet.

Among the applications of the invention are the separation of a sheet from the top of a pile prior to its being forwarded to the printing machine, the control of a printed sheet as it is advanced towards the delivery pile, and the control of a printed sheet when it is over the pile to facilitate its deposit on the pile.

According to the main feature of the present invention air is blown at high velocity over the upper or lower surface of a substantially horizontal sheet so as to reduce the static pressure at that surface and thereby cause the sheet to be urged upwardly or downwardly.

It is within the ambit of the invention to direct air over a portion only of the sheet surface in order to obtain a localised vertical control on the sheet.

The air is preferably directed on to the sheet at a slight inclination.

An important application of the invention is for delivery apparatus incorporating a chain delivery with grippers for drawing a printed sheet by its leading edge from the impression cylinder to a position over a delivery pile on to which it is deposited. To control the advance of each sheet over to the pile, the delivery apparatus is sometimes provided with a series of suction rollers, mounted on a transverse shaft, over which the trailing portion of the sheet rides when it moves clear of a feed table or tray. The suction rollers act to grip and steady the sheet as it trails. It has been found that with certain papers, and at high speeds, the trailing portion of the sheet tends to flap or wave. As a result there is irregular contact of the sheet with the rollers, which therefore do not exert their full or proper control.

To overcome this fault, in accordance with the present invention, air is blown at high velocity over the undersurface of the sheet opposite to its direction of travel as it advances towards the suction rollers.

Several forms of the invention are illustrated by way of example in the accompanying drawings, in which:

FIG. 1 is a view in side elevation showing diagrammatically a chain delivery for feeding sheets from a printing machine to a delivery pile;

FIG. 2 is a plan view of FIG. 1; and

FIG. 3 is a view in side elevation showing sheet feeding apparatus for a printing machine.

Referring first to FIGS. 1 and 2, a sheet **10** is conveyed from a printing machine to the delivery pile **11** in a conventional manner by grippers **12** on a cross-bar **30** of a chain delivery **13** incorporating endless chains **14** riding over sprockets **15** over the back of the pile.

As the sheet is drawn by its leading edge towards the pile, it passes over the usual delivery board **16** on to a series of suction rollers **17** mounted on a tubular cross-shaft **18**. The suction rollers have in known manner apertures **19** on their periphery, which communicate with the interiors of the rollers, to which suction is applied through the tubular cross-shaft. The suction rollers act

to grip the sheet and steady it against flapping as it moves towards the pile.

To ensure that the moving sheet comes into contact with the rollers, a cross-pipe **20** is fitted directly behind the rollers **17** a short distance (say 3/16 inch) below the top level of the rollers. The cross-pipe has a series of jets **21**, in the form of round holes in the pipe (of about 1/8 inch). The cross-pipe is connected at **22** to a source of high-pressure air. The jets **21** are so set as to cause air at high velocity to impinge at a slight angle (up to 10°) against the undersurface of the advancing sheet. This is to ensure that the air flows on the surface of the sheet. As the discharge end of the feed-board **16** is arranged close to the rollers **17**, the air stream will flow as a thin layer (or layers) between the sheet and the feed-board. An important subsidiary effect is that the intervening air layer acts as a cushion to prevent the sheet rubbing along the feed-board. This will assist in preventing smudging when the sheet is printed on its underside.

As a result of the reduction in static pressure under the sheet, the sheet is drawn down firmly on to the suction rollers **17** to enable them to exert their proper control in feeding the sheets forward.

There is with advantage a jet **21** arranged in line with each roller set close to its periphery so as to concentrate the maximum velocity of the air blast substantially along paths leading to the rollers.

The cross-pipe **20** may be mounted for swivelling movement about its axis (e.g. in bearings **23**) for adjusting the angles of the jets or nozzles.

The air pressure may be maintained continuously or operated periodically in time with the passage of the sheets.

In another application of the invention, air is jetted along the undersurface of the individual sheets to assist their deposit one by one on top of the delivery pile. Thus a transverse series of jets or nozzles may be arranged above the level of the pile, and at its back end, for directing an air blast at high velocity against the undersurface of a sheet as it is advanced by the chain delivery over the pile. Such an arrangement is shown in FIGS. 1 and 2. The cross-pipe is shown at **25** and may be mounted to swivel like the cross-pipe **18**. Here the jets are replaced by nozzles on short pipes **28**. The result is that the sheet is drawn down firmly on the pile instead of being allowed as normally to float down by gravity. Apart from affording a control over the descent of the sheet, the forwardly-directed air blast acts to slow down by its frictional effect the forward movement of the sheet after it has been released by the chain grippers.

As an example of a further application, shown in FIG. 3, air may be blasted from jets **26** on a cross tube **27** in proper timed relation over the top surface of a feed pile for raising and separating the top sheet for forwarding by suckers **30** for the printing operation.

We claim:

1. A sheet delivery apparatus for a printing press comprising, in combination, a sheet delivery pile, a chain delivery equipped with grippers for drawing the printed sheets by their leading edges in non-overlapping relation from printing position to said delivery pile, and air blowing means arranged in advance of and adjacent the sheet delivery pile for directing air under pressure in a thin stream against the under surfaces of the successive sheets in the vicinity of the delivery pile during their advance by the chain delivery and in a direction opposite to the direction of advance, said air stream being directed upwardly against the advancing sheets at such an angle as to reduce the static pressure at the under surfaces of the sheets and thereby cause the sheets to be pulled downwardly from their path of travel.

2. A sheet delivery apparatus according to claim 1, wherein the air blowing means comprises a series of jets arranged in a transverse row across the direction of advance of the successive sheets and substantially throughout the width of the advancing sheets.

3. A sheet delivery apparatus according to claim 2, including a series of suction rollers arranged between the air jets and the delivery pile for gripping the under surfaces of the successive sheets as they pass into delivery position above the pile, the downward pull of the air jets insuring contact of the successive sheets with the suction rollers.

4. A sheet delivery apparatus for a printing press comprising, in combination, a sheet delivery pile, a chain delivery equipped with grippers for drawing the printed sheets by their leading edges in non-overlapping relation from printing position to said delivery pile, and means arranged beyond the printing position and in advance of the sheet delivery pile for blowing air under pressure at an upward angle of inclination of approximately 10° against the under surfaces of the successive sheets during their advance by the chain delivery in a direction opposite to the direction of advance, said air blowing means acting to pull the successive sheets downwardly from their path of travel.

5. A sheet delivery apparatus according to claim 4, including suction rollers positioned between the air blowing means and the delivery pile for gripping the under surfaces of the successive sheets as they pass into delivery position above the pile, the downward pull of the air blowing means insuring contact of the successive sheets with the suction rollers.

6. A sheet delivery apparatus for a printing press comprising, in combination, a sheet delivery pile, a chain delivery equipped with grippers for drawing the printed sheets by their leading edges in non-overlapping relation from printing position to said delivery pile, a sheet delivery board underlying the chain delivery and terminating adjacent the delivery pile, and air blowing means arranged at the delivery end and above the level of the delivery board and in advance of the sheet delivery pile for directing a thin air stream upwardly at a small angle against the under surfaces of the successive sheets in the vicinity of the delivery pile during their advance by the chain delivery and in a direction opposite to the direction of advance so as thus to reduce the static pressure at the under surfaces of the advancing sheets and thereby cause the sheets to be pulled downwardly from their path of travel toward the delivery board.

References Cited in the file of this patent

UNITED STATES PATENTS

1,014,175	Pribil	Jan. 9, 1912
1,156,903	Henderson	Oct. 19, 1915
1,465,385	White	Aug. 21, 1923