Aug. 8, 1967 R. E. SHARKEY 3,334,897

METHOD AND APPARATUS FOR CONTROLLING CURVATURE IN PRINTED SHEETS BEING WITHDRAWN FROM AN IMPRESSION CYLINDER

Filed May 25, 1965 2 Sheets-Sheet 1

Fig. 1.

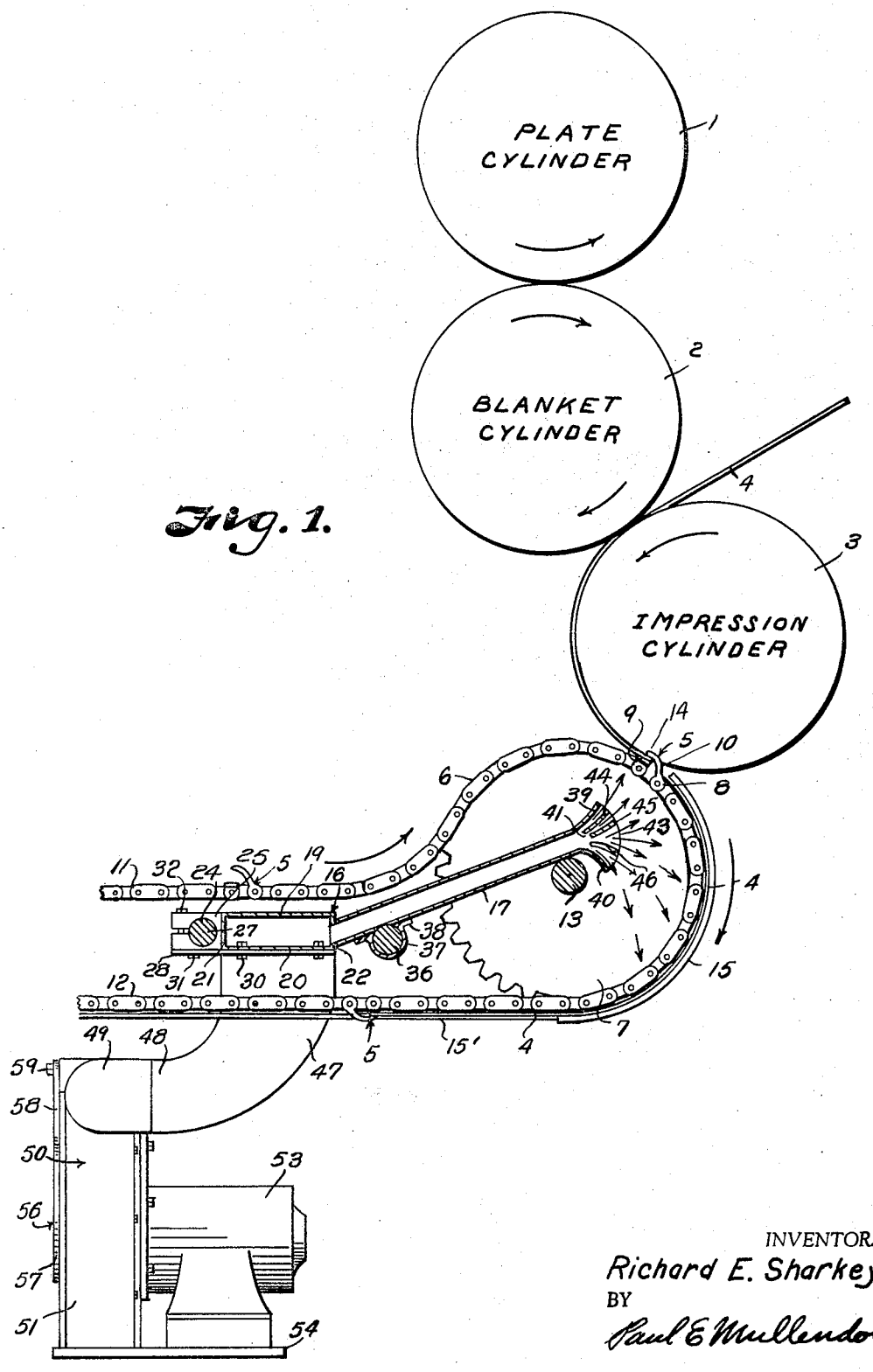

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Fig. 2.

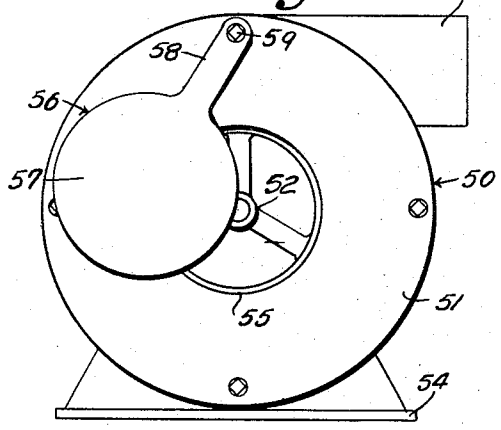


Fig. 4.

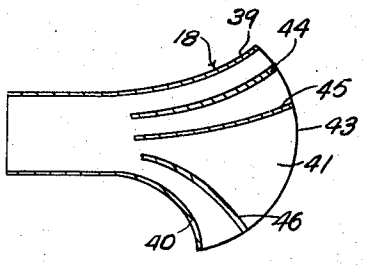


Fig. 3.

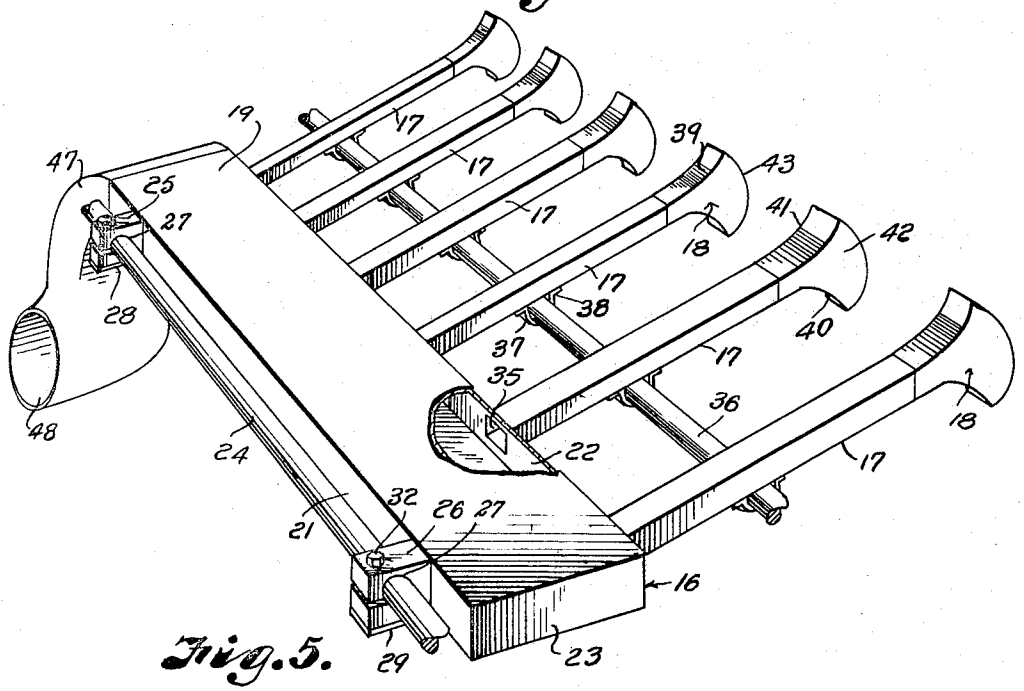
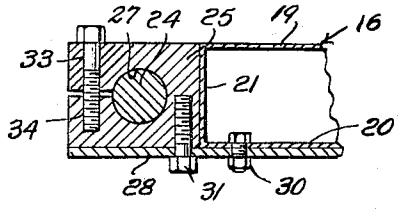


Fig. 5.



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METHOD AND APPARATUS FOR CONTROLLING CURVATURE IN PRINTED SHEETS BEING WITHDRAWN FROM AN IMPRESSION CYLINDER

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5 Claims. (Cl. 271—74)

This invention relates to printing presses, and more particu'arly to a method and apparatus for taking printed sheets from the impression cylinder of a press in a manner to avoid the possibility of smearing the freshly applied ink.

For example, it is the present practice to take sheets from the impression cylinder of a press by guiding them around the periphery of a skeleton cylinder that comprises a series of disks that are adjustable along a shaft that extends parallel with the axis of the impression cylinder. Since the printed surface of the sheets come off the impression cylinder in contact with the skeleton wheel, the disks are so adjusted along the shaft that the peripheries thereof contact the portions of the sheet which do not have ink. However, in many jobs the sheets have printing over most, or all, of the area, and it is obviously impossible to avoid contact of freshly applied ink with the peripheries of the disks composing the skeleton cylinder. Consequently, the ink is smeared or the sheets are streaked, so that the result is a poor printing job.

With the above in mind, it is the principal object of the present invention to eliminate the skeleton cylinder and to hold the sheets in desired curvature by means of a large volume of air flow in moving contact with the printed surface of the sheets to retain curvature of the sheets.

It is also an object of the invention to accomplish the result with a relatively simple, inexpensive apparatus which includes a simple rotary blower in connection with a duct and nozzle system by which the air is distributed efficiently in such large volume flow that the sheets are literally ballooned into desired curvature without the necessity of any guides on the printed surfaces of the sheets.

Further objects of the invention are to provide nozzles by which large volume streams of relatively low pressure air are redivided and efficiently distributed substantially uniformly over the sheets without material loss in pressure, to produce reverse curvature in the sheets closely following the curved path of the grippers on the offtake conveyor, and to provide apparatus that is easily installed in an existing type press with or without removal of the disks which compose the skeleton cylinder.

In accomplishing these and other objects of the invention as hereinafter described, an improved apparatus is provided, the preferred form of which is illustrated in the accompanying drawings, wherein:

FIG. 1 is a diagrammatic view of a printing press, showing a longitudinal section through an apparatus involving the preferred form of the present invention.

FIG. 2 is an elevational view of the inlet side of the blower, particularly illustrating the damper control of the inlet for regulating the volume of air.

FIG. 3 is a perspective view of the air distributing duct and the outlets connected therewith.

FIG. 4 is an enlarged section of one of the air dividing and directing nozzles, to better show the air directing baffles.

FIG. 5 is a fragmentary section of one of the brackets that support the main air flow duct.

Referring more in detail to the drawings:

1, 2 and 3, designate, respectively, the plate cylinder,

blanket cylinder, and impression cylinder of a printing press, the cylinders being shown diagrammatically. An ink impression is transferred from the plate cylinder 1 onto the blanket cylinder 2 for transfer onto sheets 4 as they are directed between the blanket cylinder 2 and the impression cylinder 3. The inked sheets 4 are taken off the impression cylinder 3 by grippers 5, that are carried by endless chains 6 operating over sprockets 7 at the respective sides of the press. Only one chain and sprocket are illustrated in the drawing, but it will be understood that two chains are used and that the grippers 5 are spaced apart on bars 8 and 9 that are carried between the chains and across the length of the cylinders. It is understood that the bars 8 have fingers 10 thereon which open and close on the fixed bars 9. The chains 6 present the grippers 5 in timed relation with the cylinders so that the forward edge of a sheet 4 is in position to be seized by a set of grippers, as shown diagrammaticaly in FIG. 1. It is understood that the sets of gripper bars are arranged at spaced intervals along the length of the chains 6 and that the endless chains are guided in upper and lower substantially horizontal runs 11 and 12 to and around the sprockets 7. The cylinders are rotated in the direction of the arrows, and the chains operate at corresponding linear speed to the peripheral speed of the cylinders. The sprockets are carried on a shaft 13 (FIG. 1) journaled in the side frames (not shown) of the press. The forward end of the printed sheet 4 is engaged by a set of grippers at a position designated 14, and the sheets are led from the impression cylinder 3 around an arcuate path in reverse curvature to the surface of the cylinder 3. As above mentioned, a skeleton cylinder (not shown) is ordinarily mounted on the shaft 13 so that the sheets are supported thereby as they come off the impression cylinder while they are guided in contact therewith by arcuate guides 15 which terminate in linear guides 15', to further control and support the printed sheets as they are carried along by the lower horizontal runs of the chains.

The press is shown in its principal elements, since the structure is complicated and specifically forms no part of the present invention. Presses as briefly described are well known to persons skilled in the printing industry. They also know that the skeleton cylinder (not shown) marks and smears the ink on the sheets.

Attempts have been made to correct these difficulties by facing the peripheral edges of the disks of the skeleton cylinder with small perforated pipes from which air jets are discharged to hold the sheets from contact with the disks. However, such trials have proved impractical, because such small pipes or tubes must be supplied with compressed air. Compressed air necessitates large and extremely costly compressors, which are also expensive to operate. Moreover, such systems as previously used require rotary seals which are troublesome to keep packed against leaks, and are in themselves a source of trouble.

The present invention includes a main duct 16 that extends transversely between the upper and lower runs 11 and 12 of the chains 6 and has a plurality of laterally extending distributing ducts 17, each of which terminates above the shaft 13 in a discharge nozzle 18.

The main duct 16 is preferably of rectangular cross section and has upper and lower walls 19 and 20 and side walls 21 and 22, all formed of flat sheet metal or other suitable material that is leaktight and offers a minimum of resistance to flow of air therethrough. One end of the duct is closed by an end wall 23. The length of the duct preferably conforms to the width of the press and it is carried in position between the runs of the chains on a rod 24 having its ends carried in the side frames of the press. To mount the duct on the rod 24, the side wall 21 has fixed thereto lugs 25 and 26 that project therefrom and are provided with openings 27 to pass the rod 24 therethrough.

The lugs **25** and **26** are further secured to the duct by straps **28** and **29** that are attached to the bottom wall **20** of the duct by fastening devices, such as bolts **30**, and to the under side of the lugs by fastening devices, such as cap screws **31** (see FIG. 4). The lugs **25** and **26** are split from the outer faces thereof into the openings **27**, so that the lugs may serve as clamps to secure the duct from turning on and shifting longitudinally of the rod when clamp screws **32** are inserted in openings **33** above the splits and turned into threaded sockets **34** below the splits (FIG. 5). The outer side wall **22** has a plurality of openings **35** spaced apart along the length of the duct, as shown in FIG. 2, to connect the smaller lateral ducts **17** thereto.

The lateral ducts are also of rectangular cross section and slope upwardly to terminate above the shaft **13** which carries the sprockets **7**. The lateral ducts may also be supported intermediate the ends thereof on a transverse rod **36** that may have its ends carried by the side frames of the press. The lateral ducts are fixed to the rod by U shaped straps **37** that engage under the rod **36** and have their ends **38** fixed to the under sides of the lateral ducts **17**. The combined flow capactiies of the lateral ducts **17** are preferably no smaller than the capacity of the main duct **16** to which they are connected.

Fixed to the terminal end of each lateral duct is a nozzle **18**. The nozzles **18** may all be of the same construction and each has an upper wall **39** curved outwardly and upwardly in the direction of the sheet gripping portion **14**, while the lower wall **40** curves forwardly and downwardly over the shaft **13** in the direction of the lower portions of the arcuate guides **15** of the press. The nozzles have sides **41** and **42** conforming to the side walls of the lateral ducts and have forward edges **43** curved somewhat similar to the curvature of the guides **15**. Inset within each nozzle and supported by the sides **41** and **42** are curved directional members **44, 45** and **46**, best shown in FIG. 3. The member **44** is curved similarly to the upper walls of the nozzles and spaced therefrom to provide a passageway for a stream of air that is directed toward the place of gripping the sheets. The members **45** are of less curvature and spaced from the upper members **44** to direct a flow of air a little further down on the sheet, while the member **46** is curved downwardly in the opposite direction to spread the air over a greater area of the sheet as the sheets are being backed by the guides **15**.

The other end of the main duct connects with an elbow **47** which converges into a circular inlet **48** that is connected with the discharge **49** of a blower **50**.

The blower **50** is of conventional design in that it has a casing **51** in which a rotor **52** is rotatably mounted. The rotor is driven by a motor **53** (FIG. 1) mounted on a base **54** common with the blower. The blower has an inlet opening **55** in a side of the casing and which is controlled by a damper **56**.

The damper includes a disk portion **57** having an arm **58** connected therewith. The arm **58** is pivotal on one of the fastening devices **59** of the blower casing (see FIG. 2) to support the disk portion **57** in covering relation with the opening in one position thereof. The disk portion **57** may thus be moved to and from covering relation with the opening to control the effective outlet area of the inlet. The damper may be held in adjusted position by tightening the fastening device **59**.

In operation of the press, the sheets, after contact by the blanket cylinder, travel on the impression cylinder to the place where the forward edges are engaged by the grippers of the offtake conveyor. Since the sheets are gripped only at their forward edge, the trailing portions would not ordinarily follow the path of the chains around the sprockets, but will tend to take a shorter path. However, with the blower in operation, all the trailing portions of each sheet will be supported on the air flow and follow the curved path of the leading edges, as now to be described.

With the blower in operation, a large flow of air is drawn through the inlet **55** of the blower casing and discharged by the rotor, or fan **52**, through the outlet **49** and elbow connection **47** into the main duct **16** to seek outlet in minor flow through the lateral ducts **17**. The air is thus distributed in a plurality of flows along the width of the sheet, to force the sheet back against the arcuate guides **15**. The minor air streams, moving through the nozzles **18**, are each divided by the vanes or members **44, 45** and **46** so that the air is spread along the length of the sheet as it is removed from the impression cylinder. The sheet is, therefore, ballooned back against the curved guides, and as the flow of air is continuous each sheet retains the circular path until it is carried into the linear path of the lower horizontal run of the offtake conveyor. Therefore, the loose or trailing end of each sheet is always under control of the air and is held thereby with the inked surface out of contact with any of the parts of the press or with itself. The damper **56** is adjusted with respect to the inlet of the blower to control the inlet of air to that required for supporting curvature in the sheets without excessive drag on the back guides **15**.

What I claim and desire to secure by Letters Patent is:

1. In combination with the impression cylinder of a printing press and means for withdrawing sheets from said cylinder including sprocket means located below said cylinder and carrying chain means providing an upper horizontal run leading to the impression cylinder and a lower horizontal run leading away from the impression cylinder, a shaft carrying the sprockets, gripping means carried by said chain means for engaging leading edges of the sheets to carry them around the sprocket means, and curved guides backing said sheets as they are carried around said sprocket means,

apparatus for controlling curvature of said sheets as they are pulled from the impression cylinder, said apparatus including

a main duct of large capacity extending transversely between said upper and lower runs in spaced parallel relation with said shaft,

means rigidly supporting the main duct,

lateral ducts spaced along and projecting from the main duct and terminating over said shaft,

nozzles on the terminal ends of the lateral ducts having sides forming continuations of side walls of the lateral ducts and top and bottom walls, with the bottom wall curving downwardly over the shaft and the upper wall curving in the general direction of the impression cylinder, to cooperate with said side walls in providing a wide open outlet therebetween through which air is discharged in large volume over a sheet being withdrawn from the impression cylinder and for holding said sheet substantially following the curved guides which back said sheets,

blower means having an inlet and having a discharge outlet connected with the main duct to supply said air,

and means for operating the blower.

2. The combination described in claim **1**,

in which each nozzle has curved vanes extending horizontally between said side walls to better distribute the air discharged through the open outlets of said nozzles.

3. The combination described in claim **1**,

and means controlling said inlet to the blower for regulating rate of air flow being supplied to said nozzles.

4. The combination described in claim **2**,

and means controlling said inlet to the blower for regulating rate of air flow being supplied to said nozzles.

5. In combination with the impression cylinder of a printing press and means for withdrawing sheets from said cylinder including sprocket means located below said

cylinder and carrying chain means providing an upper horizontal run leading to the impression cylinder and a lower horizontal run leading away from the impression cylinder, a shaft carrying the sprockets, gripping means carried by said chain means for engaging leading edges of the sheets to carry them around the sprocket means, and curved guides backing said sheets as they are carried around said sprocket means,

apparatus for controlling curvature of said sheets as they are pulled from the impression cylinder, said apparatus including

a main duct of large capacity extending transversely between said upper and lower runs in spaced parallel relation with said shaft,

supporting rods extending parallel with the main duct with one of said supporting rods being located between the main duct and said shaft,

means rigidly supporting the main duct to the other of said supporting rods,

lateral ducts spaced along and projecting from the main duct and terminating over said shaft,

means securing the lateral ducts to said one supporting rod,

nozzles on the terminal ends of the lateral ducts having sides forming continuations of side walls of the lateral ducts and top and bottom walls, with the bottom wall curving downwardly over the shaft and the upper wall curving in the general direction of the impression cylinder, to cooperate with said side walls in providing a wide open outlet therebetween through which air is discharged in large volume over a sheet being withdrawn from the impression cylinder and for holding said sheet substantially following the curved guides which back said sheets,

blower means having an inlet and having a discharge outlet connected with the main duct to supply said air,

and means for operating the blower.

References Cited

UNITED STATES PATENTS

1,488,673	4/1924	Henderson	271—26
2,736,106	2/1956	Offen	226—97 X
2,850,228	9/1958	Rowley.	
2,933,039	4/1960	Claybourn et al.	271—69 X

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