Dec. 1, 1931. C. F. DAUSMANN 1,834,147

METHOD AND MEANS FOR DRYING INK IMPRESSIONS IN WEB PRESSES

Filed Jan. 21, 1929 4 Sheets-Sheet 1

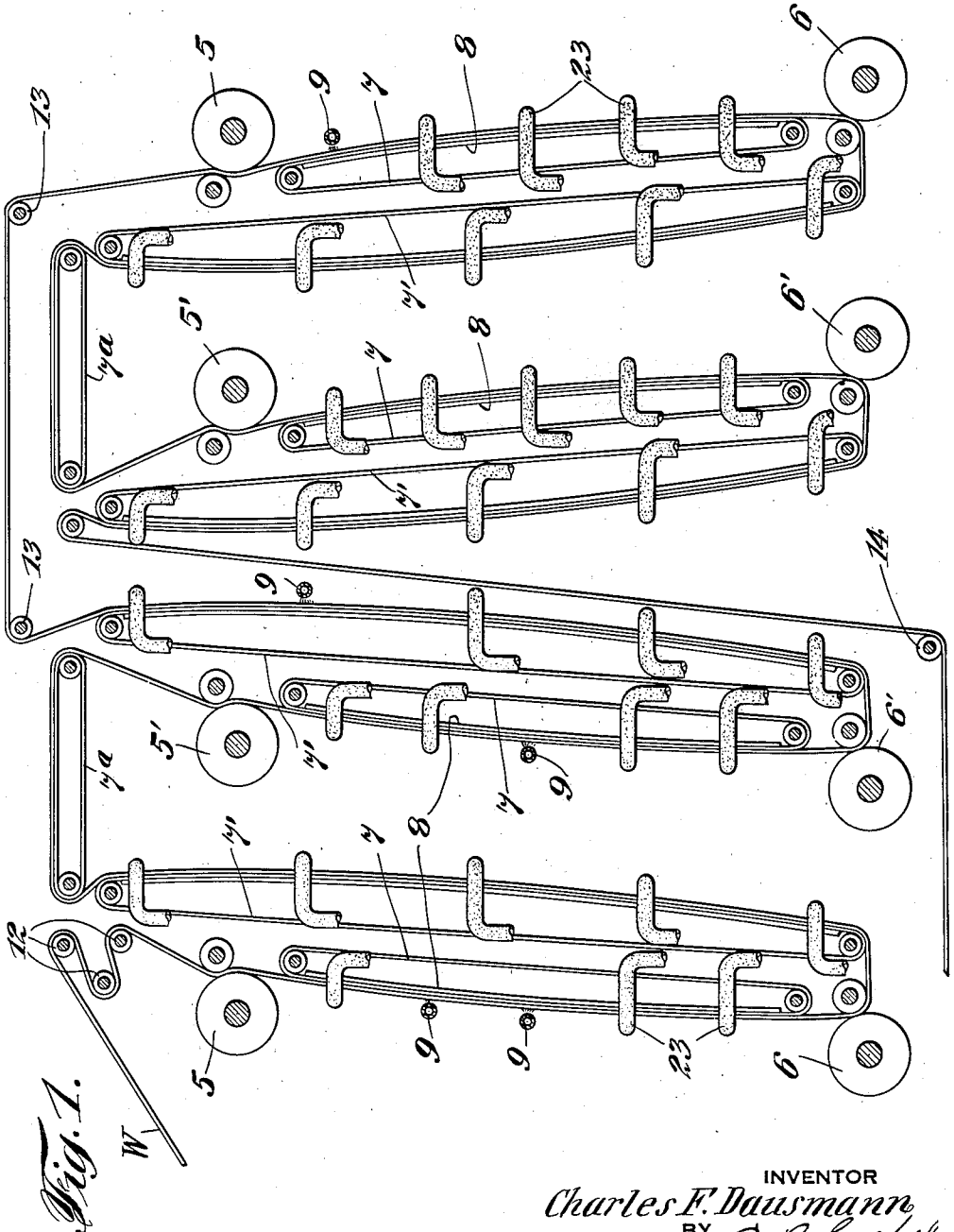


Fig. 1.

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Fig. 2.

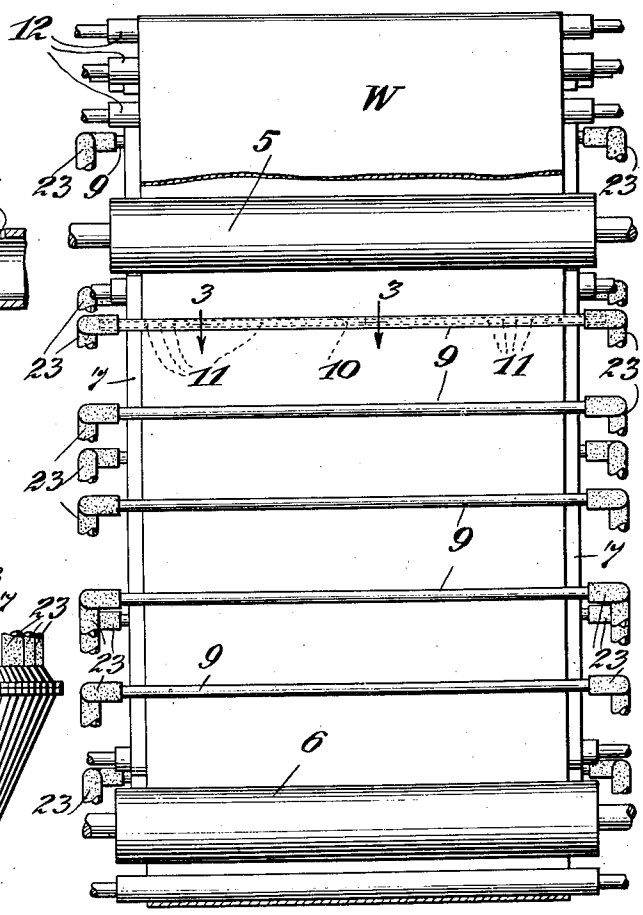


Fig. 3.

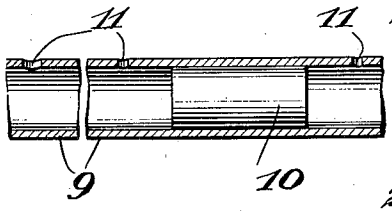
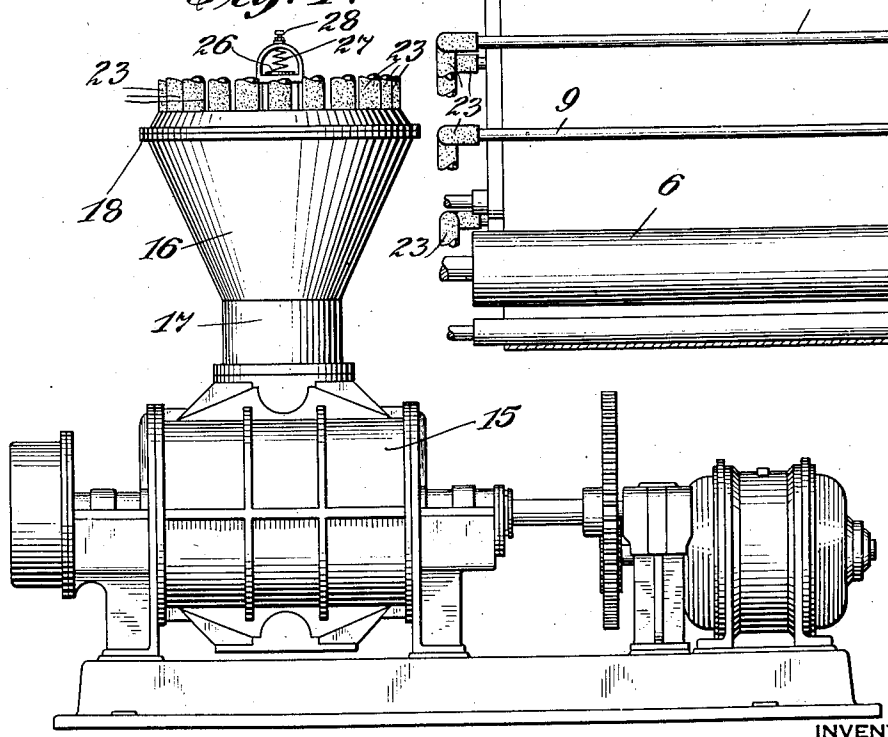


Fig. 4.



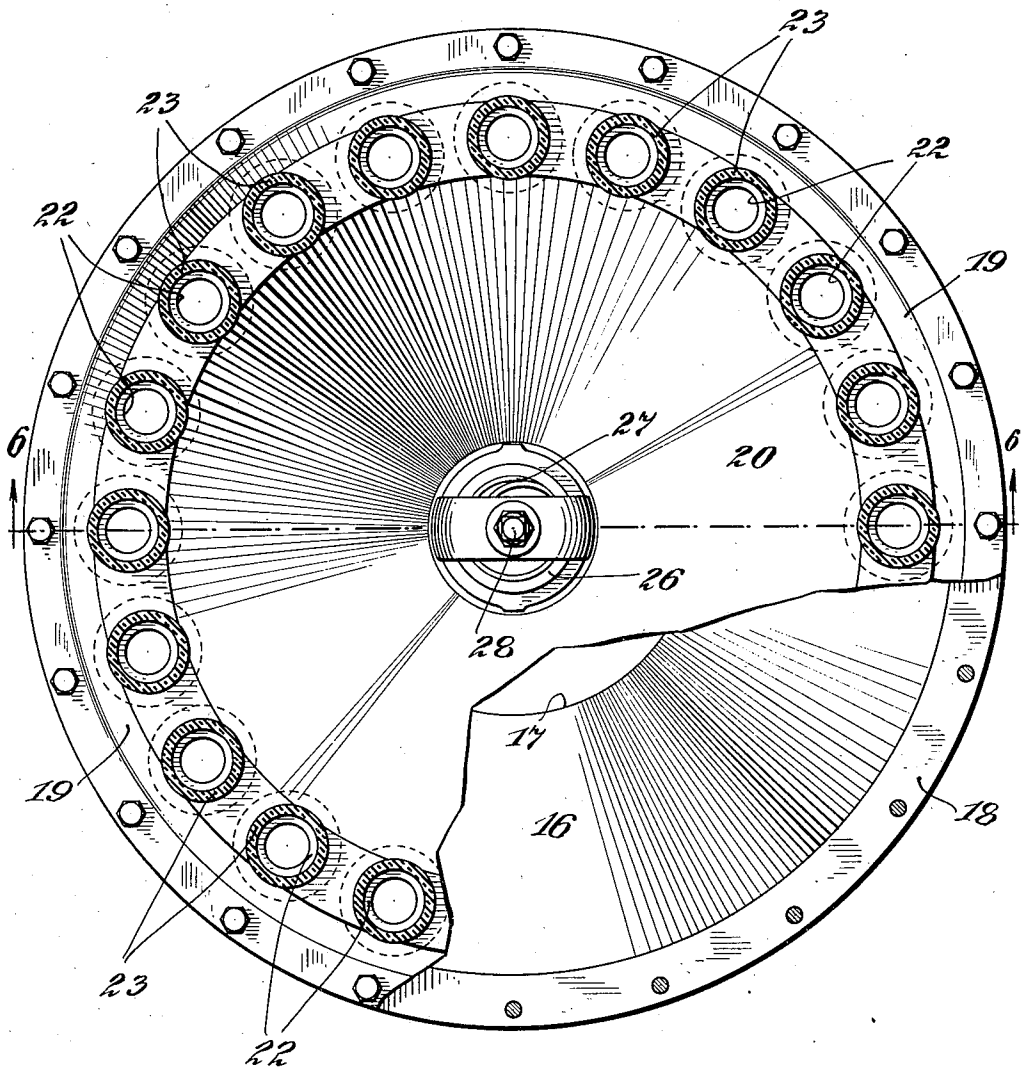
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METHOD AND MEANS FOR DRYING INK IMPRESSIONS IN WEB PRESSES

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Fig. 5.



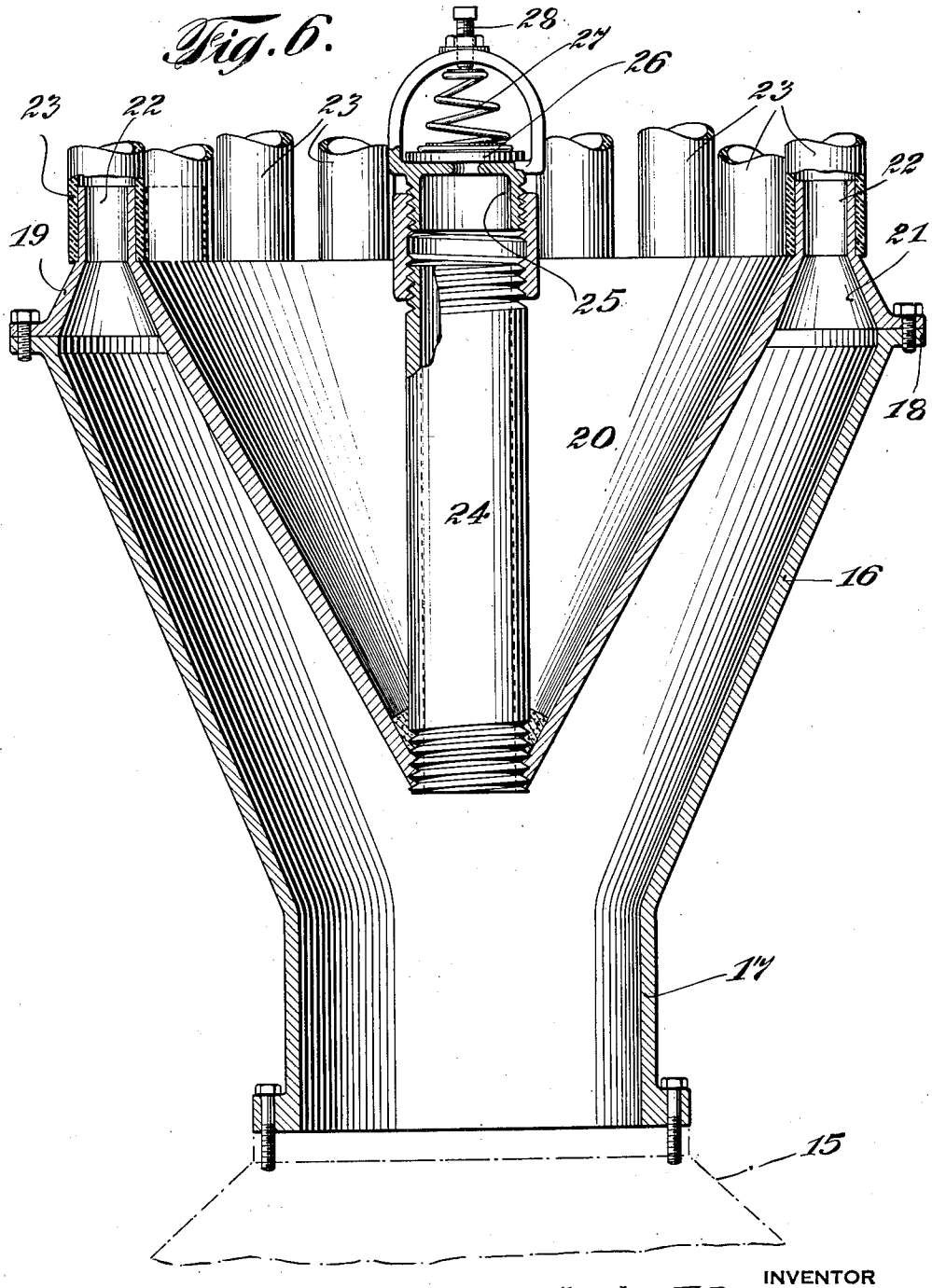
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METHOD AND MEANS FOR DRYING INK IMPRESSIONS IN WEB PRESSES

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Fig. 6.



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UNITED STATES PATENT OFFICE

CHARLES F. DAUSMANN, OF OAK PARK, ILLINOIS

METHOD AND MEANS FOR DRYING INK IMPRESSIONS IN WEB PRESSES

Application filed January 21, 1929. Serial No. 333,773.

This invention relates to an improved method and means for drying ink impressions in a web press, and has for its primary object and purpose to provide an ink drying method and means which is more particularly designed for application and use in connection with a multi-color press wherein ink impressions in a plurality of different colors are successively applied to different sections of the web surface.

It is one of the principal objects of my new method to effect the thorough absorption of the ink of each color after the web leaves the printing cylinder of one printing couple and before the section of the web which has received the ink impression reaches the next printing couple where ink impressions of a contrasting color are applied, and without deflecting the web from its line of movement or subjecting the same to the action of heat which would have such resultant effects upon the paper web as to prevent proper registration of the web with the cylinders of the successive printing couples.

In carrying out my proposed method, in a practical embodiment thereof, the moving paper web, after having received the ink impression from one printing cylinder, is supported against deflection from its plane of movement while a suitable pressure is applied against the inked surface of the supported area of the paper web and directly upon the ink, without retarding or impeding the continuous movement of the web so that the ink is thereby caused to impregnate the paper and be rapidly absorbed by the web fibers. Therefore, when ink impressions of a different color are applied to the surface of the moving web by a second printing cylinder and in close juxtaposition to the ink impressions of the preceding cylinder, the running together or the shading of the ink of one color into that of a contrasting color, is entirely obviated.

The invention also has for a further object to provide a simple and efficient mechanical means for carrying out this new method, in which I preferably provide a web support between the spaced printing couples contacting with one side of the web and moving therewith at the same linear speed together with means arranged in opposition to this web support for directing a multiplicity of low pressure jets of air at each of a plurality of spaced points between the printing couples against the printed surface of the web.

With the above and other objects in view, the invention consists in the improved method and means for drying ink impressions in web presses as will be hereinafter more fully described, illustrated in the accompanying drawings, and subsequently incorporated in the subjoined claims.

In the drawings, wherein I have disclosed one simple and practical embodiment of the apparatus for carrying out my new method, and in which similar reference characters designate corresponding parts throughout the several views,—

Figure 1 is a diagrammatic view of a multicolor printing press showing one application of the present invention;

Fig. 2 is a front elevation showing one pair of printing couples of the press and the ink drying means arranged therebetween;

Fig. 3 is a detail section on an enlarged scale taken substantially on the line 3—3 of Fig. 2;

Fig. 4 is an elevation of a conventional type of blower and an air distributing nozzle connected therewith to distribute air in equal volume and uniform pressure to the opposite ends of jet delivery pipes;

Fig. 5 is an end elevation of the distributing nozzles, and

Fig. 6 is a longitudinal sectional view thereof taken on the line 6—6 of Fig. 5.

In Fig. 1 of the drawings, I have illustrated an arrangement of printing couples in a web press in two sets for printing upon the opposite sides of the paper web in four colors in one movement of the web through the press. As shown, each set of printing couples consists of two pairs arranged in laterally spaced relation and each pair having an upper couple 5 and 5′ respectively, and a lower couple 6 and 6′ respectively. Each couple includes the usual printing cylinder having an intaglio or etched surface to en-

gage one side of the paper web and a pressure cylinder engaging the opposite side of the web. Ink of different colors is supplied to the several cylinders by any suitable means. Thus, of the cylinders printing upon each side of the web, the upper cylinder 5 may print in yellow ink, the lower cylinder 6 in red, the upper cylinder 5′ in blue and the lower cylinder 6′ in black. Of course, it is understood that such colors may be successively applied in different order, or other colored inks than those referred to may be used.

Between the upper and lower printing couple in each set, a web registering device is arranged for the purpose of securing proper registration between the different sections of the surface of the paper web which receive the ink impressions from the successive printing cylinders. The construction and arrangement of these web registering devices may be generally similar to that disclosed in Patent No. 1,482,356, issued January 29, 1924, to my assignee, The Prismatone Company, Inc., and therefore, requires no detail description in this application. For the purposes of the present explanation, it will suffice to state that each registering device includes an endless traveling blanket 7 surfaced with rubber on its outer side and having one stretch thereof movable over the surface of a rigidly supported metal plate 8 extending substantially the entire length and width of said blanket. The outer face of this stretch of the moving blanket engages one side of the paper web for substantially the entire distance between the upper and lower printing couples in each pair.

Through the medium of suitable gearing the blanket 7 is driven at the same linear speed as the movement of the paper web through the press so that no relative movement between the section of the paper web engaged with the blanket and said blanket will occur, which relative movement would tend to stretch or tear the paper web.

At vertically spaced points between the upper and lower printing couples in each pair and closely adjacent to the impression receiving surface of the paper web which extends between the printing couples, a plurality of transversely positioned tubes or pipes 9 are suitably supported, said pipes extending entirely across the press and projecting at their opposite ends beyond the side edges of the paper web and the blanket 7. The interior of each of these tubes is centrally divided by the plug indicated at 10 and the wall of each tube opposed to the surface of the web is provided with the jet orifices indicated at 11 which vary in diameter from the opposite ends of the tube to its central portion so that the air jets discharged through said orifices would be of substantially equal pressure.

Various means may be provided for supplying air at low pressure to the opposite ends of the tubes 9.

The paper web indicated at W is drawn from the roll around a series of ironing rollers 12, after which it receives the first impression on one surface of the web from the cylinder of the upper printing couple 5. It then moves downwardly together with one stretch of the blanket 7 with which the web is engaged and receives its next impression from the cylinder of the lower printing couple 6. The web then moves upwardly over one side of a second endless registering blanket 7′ which is of greater length than the blanket 7 positioned between the printing couples and extends above the latter. The web then passes over the upper stretch of a horizontally positioned blanket 7^a, then downwardly to the cylinder of the upper printing couple 5′ where it receives the third colored ink impression and over the second registering blanket 7 to the cylinder of the lower printing couple 6′ where the final color impression is made. From this printing couple, the web then passes upwardly with a second moving blanket 7′ and is then guided laterally over suitable supporting rollers indicated at 13 to the second set of printing couples where the web traverses substantially a similar course and the four color impressions are made on the opposite surfaces of the web, after which the web finally leaves the press from the guiding or directing roller indicated at 14.

With each of the web supporting blankets 7′ which are mounted in close relation to the blanket 7, a vertically spaced series of the air jet distributing pipes or tubes 9 is also associated. Preferably, there are five of these tubes in each series each delivering the spaced air pressure jets across the entire width of the paper web while the web is in contact with the moving blanket, which in turn is supported by the rigidly fixed metal plate 8. Thus, it will be apparent that the paper web cannot yield or flex in a direction at right angles to the plane of its movement.

While various means may be provided for supplying the jet delivering tubes 9 with air at low pressure, in the present instance, I have shown a conventional type of blower 15 which is associated with each set of printing couples for printing on one side of the paper web. This blower is therefore, provided with means for equally distributing the air delivered thereby to the twenty pipes or tubes 9. This means, as herein shown, preferably consists in the nozzle of the construction shown in detail in Figs. 5 and 6 of the drawings. The body of this nozzle has a frustoconical wall 16 provided with a neck 17 at its smaller end for connection with the outlet of the blower 15. The other or larger end of the nozzle body 16 has an annular flange 18 to which the nozzle head 19 is suitably attached. This nozzle head includes an

inner conical wall 20 extending inwardly and in divergent relation to the wall of the nozzle body 16. The outer or larger end of this wall 20 is surrounded by an outwardly projecting rim or flange integral with said wall and provided with tapering pockets 21 terminating at their smaller ends in the nipples 22 projecting beyond the end of the wall 20. The larger ends of these pockets 21 communicate with the space between the wall 20 and the body wall 16 of the nozzle. With each of the nipples 22 one end of a flexible hose or tube 23 is connected, the other end of each hose receiving one end of one of the jet pipes or tubes 9.

In the smaller end of the conical wall 20 of the nozzle head of the blower a length of pipe 24 is suitably fixed and with the outer end of this pipe a centrally orificed cap member 25 is connected. This orifice is normally closed by a valve plate 26 yieldingly held against movement relative to the wall of the cap by the spring 27. An adjusting screw 28 is mounted in a suitably formed part fixed on the cap member and has bearing engagement with one end of the spring 27 whereby the tension of this spring may be regulated. Thus, the pressure of the air delivered from the blower to the several tubes 23 and hence to the pipes or tubes 9 may be controlled, and when such pressure exceeds a predetermined limit, the valve plate 26 will be lifted to permit of the escape of the excess pressure through the orifice of the cap 25. It will however, be understood that any other suitable or convenient means may be provided for regulating the blower pressure supplied to the jet delivery tubes 9. It is important that the pressure of the air as it is delivered through the jets 11 shall not be too great, as this would have a tendency to spread the fluid ink laterally on the surface of the paper web. It is desirable therefore, to so regulate the operation of the blower that there will be a gentle pressure of air at substantially room temperature distributed more or less uniformly upon the inked surface of the paper web at a plurality of vertically spaced points between the upper and lower printing couples during the travel of the web with the moving blanket. I have shown one form of the mechanical apparatus, which in practical use, has given very satisfactory service.

It is not possible, in a multi-color web press to use either steam or hot air for the purpose of drying the ink, since the change in temperature of the paper web results in the expansion of the sheet to such an extent that perfect registration of the different colors would not be obtained, notwithstanding the use of the registering devices between the spaced printing couples. However, I have been able to insure the complete drying of the ink impressions with the use of air jets at low pressure, and by releasing a large number of the closely spaced air jets across the moving web at a plurality of vertically spaced points, each impression is repeatedly acted upon by the air jets and the ink is mechanically driven into the body of the web sheet to be absorbed by the fibers thereof. Thus, even in the highest speed operation of such a press, the ink impressions of one color will be thoroughly dry before the ink impressions of a contrasting color are applied. Thus, I completely avoid the possibility of non-registration and also obviate the admixture or running together of the fluid inks of relatively different colors on the surface of the web.

From the foregoing description considered in connection with the accompanying drawings, the operation of my new method of drying the ink impressions in web presses and the several advantages thereof particularly when used in connection with multi-color presses of this type will be fully understood. It is apparent of course, that the method is likewise applicable to presses of various other types and in which the spaced printing couples may be otherwise mounted and arranged than as indicated in the accompanying drawings.

Accordingly, it is to be understood that in so far as the mechanical features of the present disclosure are concerned, various changes in detail and in the application and arrangement of the apparatus with respect to the traveling web or sheet, as well as possible variations or equivalents for the several novel steps of my new method might be resorted to. I therefore, reserve the privilege of adopting various changes in these particulars, as may be fairly embodied within the spirit and scope of the invention as claimed.

I claim:

1. A method of drying ink impressions in a web press having vertically spaced printing couples each consisting of a printing cylinder and a presser roll which consists in supporting the paper web at one side thereof and substantially for the entire distance between the spaced printing couples against deflection from its plane of movement, and subjecting the opposite printed side of the paper web to a gentle fluid pressure acting directly upon the ink to cause the same to be substantially wholly absorbed by the web fibers.

2. A method of drying ink impressions in a web press having vertically spaced printing couples each consisting of a printing cylinder and a presser roll which consists in supporting the paper web at one side thereof and substantially for the entire distance between the spaced printing couples against deflection from its plane of movement, and means for subjecting the opposite printed side of the paper web at a plurality of spaced points between the printing couples to the action of a multiplicity of low pressure air jets

whereby the ink impressions are repeatedly acted upon by a comparatively gentle pressure causing the fluid ink to impregnate the web and be substantially wholly absorbed by the fibers thereof.

3. In combination with a web press having vertically spaced printing couples each consisting of a printing cylinder and a presser roll, a rigid backing plate at one side of the web extending substantially the entire vertical distance between the printing couples and preventing deflection of the web in one direction from its plane of movement, and means extending across the paper web at the opposite side thereof for delivering unheated air at low pressure against the printed surface of the web to thereby cause the fluid ink to impregnate the web and be substantially wholly absorbed by the fibers thereof.

4. In combination with a web press having vertically spaced printing couples each consisting of a printing cylinder and a presser roll, a rigid backing plate at one side of the web extending substantially the entire vertical distance between the printing couples and preventing deflection of the web in one direction from its plane of movement, and a plurality of vertically spaced air jet delivery tubes extending across the paper web at the opposite side thereof each delivering a multiplicity of unheated air jets at low pressure against the moving web in a direction substantially at right angles to said backing plate, said air jets exerting a relatively gentle pressure directly upon the fluid ink to cause the same to impregnate the web sheet and be substantially wholly absorbed by the fibers thereof.

In testimony that I claim the foregoing as my invention, I have signed my name hereto.

CHARLES F. DAUSMANN.