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AIR HEATING DEVICE FOR INCORPORATION IN PRINTING APPARATUS

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Fig. 1.

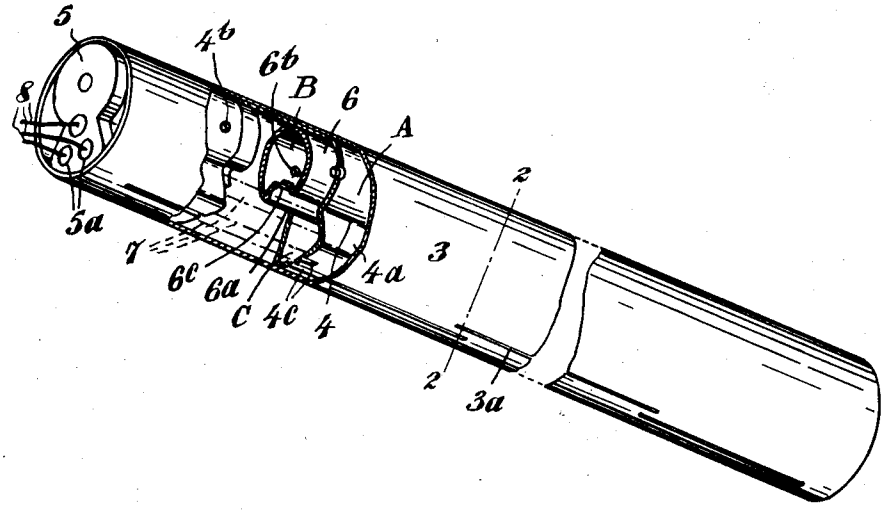
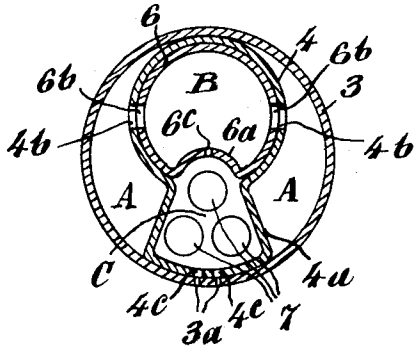



Fig. 2.




INVENTOR
ANGUS MURRAY HALLEY
Norris + Bateman
ATTORNEYS

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# AIR HEATING DEVICE FOR INCORPORATION IN PRINTING APPARATUS

Angus Murray Halley, Moseley, Birmingham, England, assignor to James Halley & Sons Limited, West Bromwich, England, a British company

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5 Claims. (Cl. 219—39)

This invention relates to an improved air heating device for incorporation in printing apparatus and has for its object to provide a compact electrically heated source of hot air which may be mounted in close proximity to a printed web for directing a transverse series of jets of hot air onto the printed web.

The invention consists of a tubular air heating device for incorporation in printing apparatus comprising a tubular body, a longitudinal partition provided within said body to furnish a longitudinally extending plenum therein, and at least one longitudinally extending resistance element mounted in the plenum, the partition being provided with one or more longitudinally extending series of apertures to permit the uniform distribution of cold compressed air into the plenum from the tubular body part exterior of the plenum, and the tubular body being provided with a longitudinal series of apertures which are adapted to direct from the plenum hot air jets from the exterior of the said body.

Preferred means for carrying the present invention into practice will now be described with reference to the accompanying drawings wherein:

Figure 1 illustrates a part sectional perspective view of an air heating device according to the invention, and Figure 2 is a cross section on the line 2—2 of Figure 1.

As seen in the drawings the heating device comprises a relatively long cylindrical metal tube 3 which constitutes the body of the device and within this tube 3 a second tube 4 having the generally "key-hole" cross-section clearly seen in Figure 2 is mounted as a push fit. The ends of the second tube 4 are closed by a pair of end plates 5 which are adapted to permit the entry of compressed air into the space designated A which is defined between the walls of the body tube 3 and the second tube 4.

Within the second tube 4 is mounted as a push fit a third tube 6 having an inwardly curved circumferential part 6*a* in register with and serving to close the innermost end of the outwardly divergent section 4*a* of the tube 4 thereby to define an intermediate chamber B within the interior of the inner tube 6 and a plenum C in the divergent section 4*a*.

To permit the entry of air from the chamber A into the intermediate chamber B opposite sides of the tubes 4 and 6 are provided with registering apertures 4*b* and 6*b* respectively; and to permit the passage of air from the intermediate chamber B into the plenum C the wall portion 6*a* of the tube 6 is provided with a series of longitudinally elongated slots 6*c* extending over substantially the whole of the length of the tube 6.

It will be appreciated that the apertures 4*b* and 6*b* are spaced along the sides of the tubes 4 and 6 as necessary to provide a substantially constant air pressure distribution within the chamber B, the necessary spacing being determined by experiment.

Mounted in apertures 5*a* in the end plates 5 is at least one and desirably three electrical resistance elements 7 which when connected through leads 8 to a source of electricity are adapted to heat the compressed air passing



through the plenum chamber C. The resistance elements are conveniently of the type wherein a helically wound resistance element is incorporated within and insulated from a cylindrical metal sheath.

To permit the passage of the heated air from the plenum C to the exterior of the body 3 in the form of a longitudinally continuous hot air jet the arcuate end wall of the divergent tube section 4*a* and the wall of the body 3 are provided with a longitudinally extending series of registering elongated slots 4*c* and 3*a* respectively. To obtain an air jet extending over the whole of the length of the body of the device alternate slots in the tubes 3 and 4 are misaligned and arranged with overlapping ends as shown in the drawings. To facilitate assembly the slots 4*c* in the second tube are somewhat wider than the narrow slots 3*a* in the body to afford easy registration of these slots.

One or more of the heating devices above described can be provided in any convenient manner with one or both ends of each device coupled to a source of compressed air in such a manner as to permit the entry of the compressed air into the end or ends of the tubular bodies, each device being mounted so that the jets of hot air emerging from the slots 3*a* are directed onto and across a web of material being processed.

It will be appreciated that a heating device according to this invention is particularly economical in use since the hot air which is directed onto the web is heated in close proximity to the web whereby heat losses are reduced to a minimum. The heating device therefore has greater efficiency than the conventional arrangement wherein the air is heated at a remote point and is led to the printing apparatus by ducting.

I claim:

1. A tubular air heating device comprising a tubular body, a second tube having a generally key-hole section mounted within the body to define an outer air chamber between the walls of said tubes, a longitudinally extending partition dividing the second tube into an intermediate air chamber and a plenum, at least one electric resistance element longitudinally mounted in said plenum, the second tube, the partition and the tubular body each being provided with apertures to admit of the uniformly distributed passage of air from the outer air chamber into the intermediate chamber, from the intermediate chamber to the plenum, and from the plenum to the exterior of the body in the form of a hot air jet extending across substantially the whole of the length of the body of the device.

2. A tubular air heating device comprising a tubular body, a second tube mounted within the body to define an outer air chamber between the walls of said tubes, a longitudinally extending partition dividing the second tube into an intermediate air chamber and a plenum, at least one electric resistance element longitudinally mounted in said plenum, the second tube, the partition and the tubular body each being provided with apertures to admit of the uniformly distributed passage of air from the outer air chamber into the intermediate chamber, from the intermediate chamber to the plenum, and from the plenum to the exterior of the body in the form of a hot air jet extending across substantially the whole of the length of the body of the device.

3. A tubular air heating device according to claim 2, wherein the said partition is formed by a third tube mounted within the enlarged section of the second tube.

4. A tubular air heating device according to claim 2, wherein the apertures in the tubular body take the form of longitudinally elongated slots which are alternately misaligned and provided with overlapping ends to produce a hot air jet extending throughout the length of the body of the device.

5. A tubular air heating device comprising a hollow

tubular body, tubular partition means extending longitudinally within said body, said partition means extending transversely entirely across the interior of said body and being laterally shaped to define with the body wall two internal air inlet chambers that extend the length of the body for introduction of air to be heated, said tubular partition means having an internal wall dividing it into a longitudinally extending intermediate chamber and a longitudinally extending plenum that lie mainly on opposite sides of the longitudinal axis of the body, means closing the opposite ends of said plenum and intermediate chamber, said intermediate chamber having a longitudinal series of side openings connecting said internal air chambers with said intermediate chamber and a longitudinal series of openings in said internal wall connecting the intermediate chamber with said plenum, heater means extending along said plenum, and means providing a longitudinal series of hot air discharge openings from said plenum through said body.




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