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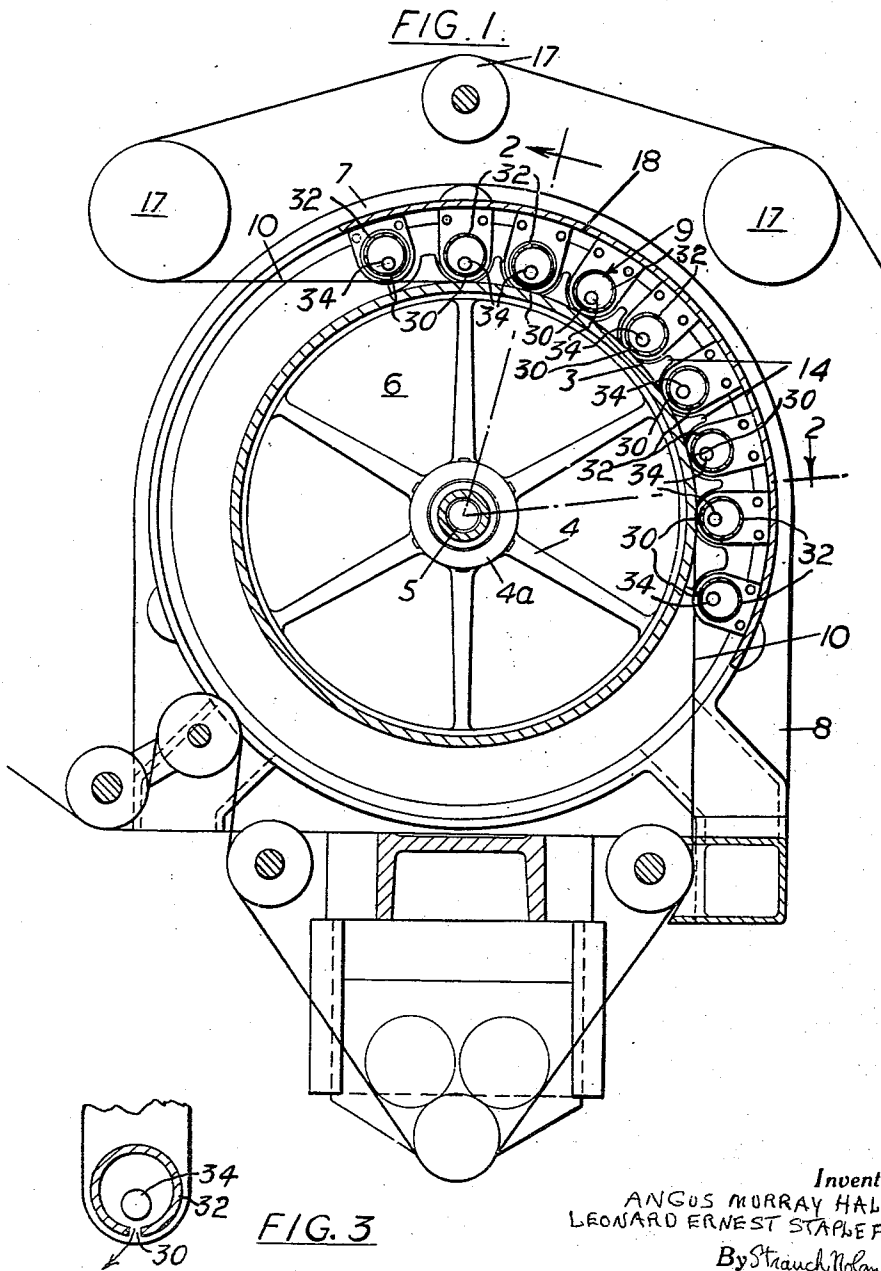
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APPARATUS FOR DRYING PRINTED WEBS OF MATERIAL

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2 Sheets-Sheet 1



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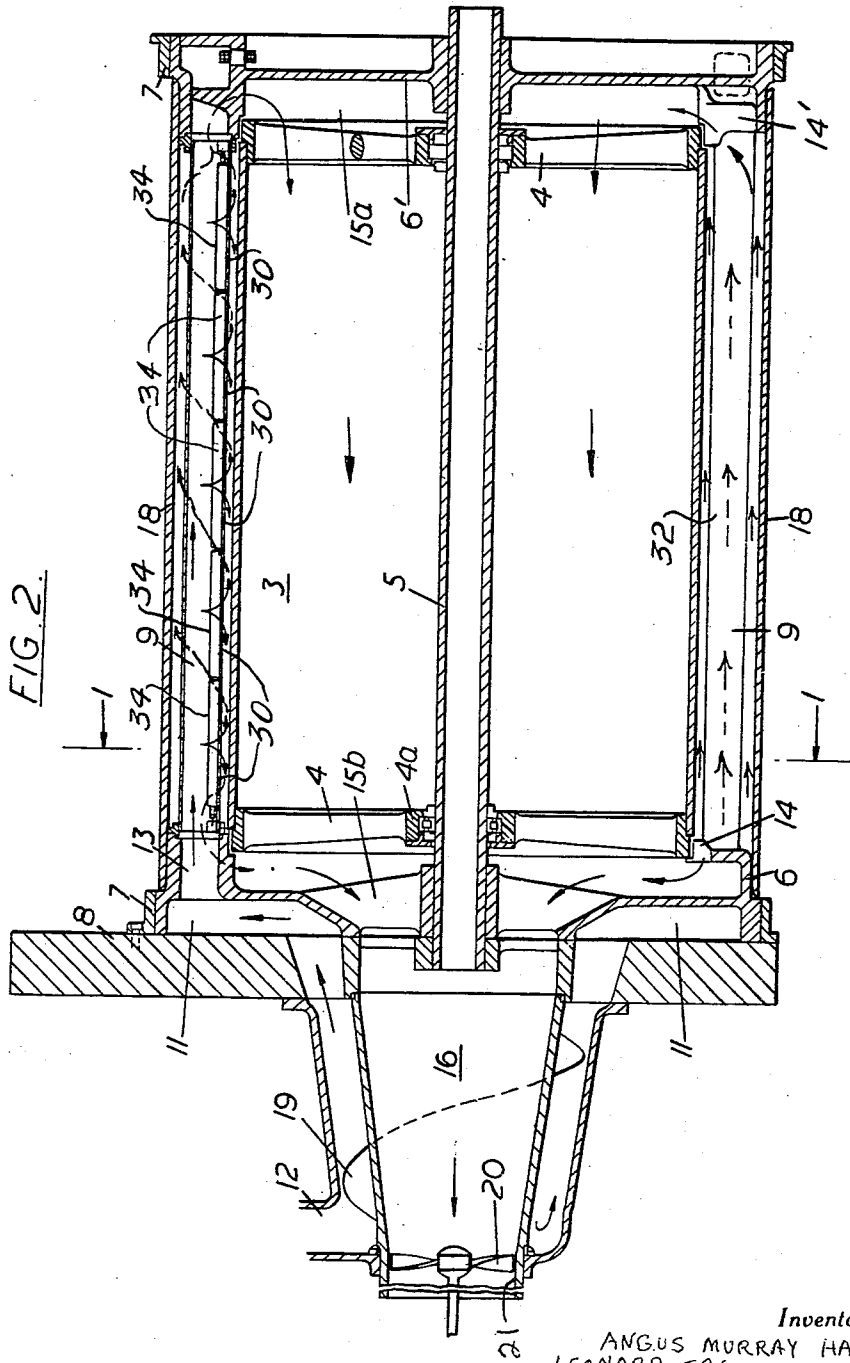


FIG. 2.

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**APPARATUS FOR DRYING PRINTED  
WEBS OF MATERIAL**

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This invention has reference to apparatus for drying printed webs of material and has for its object to provide improved apparatus for drying the web through the agency of hot air currents in such manner that the heat content of the air currents is transferred to the web with high efficiency.

The invention consists of apparatus for drying a continuously moving printed web of material including a rotatable drum for the support of a part of the length of the web, a plurality of tubular electric heaters disposed adjacent to that part of the exterior surface of the drum which carries the web, and arranged to direct jets of hot air on to the web as shown by the arrows of FIGURE 2, a casing for the support of the tubular heaters in relation to the drum which casing in conjunction with the drum defines a path for the flow of air to the heaters and a path for a part of the hot air subsequent to its impingement on the web, into the interior of the drum thereby to heat the drum internally to assist the drying of the web part thereon, and fan means for circulating the air through the casing in the aforesaid manner.

Preferred means for carrying the invention into practice will now be described by way of example with reference to the accompanying drawings, wherein:

FIGURE 1 is a sectional elevation of a drying unit according to the invention substantially along line 1—1 in FIGURE 2,

FIGURE 2 is a part sectional end elevation of the unit substantially along line 2—2 of FIGURE 1, and

FIGURE 3 is an enlarged cross-sectional view of one of the heater units as illustrated in FIGURE 1.

The apparatus seen in the drawings incorporates a rotatable drum comprising a hollow cylindrical wall 3 which is supported at each end on the rim of a spoked wheel-like member 4 the hub 4a whereof is rotatably mounted by anti-friction bearings on a tubular shaft 5 which is fixed at its ends in a casing.

The casing comprises a pair of shells 6 and 6' one about each end of the drum 3 and an arcuate cover plate 18 of cylindrical form extending between and secured to shells 6 and 6' radially outwardly of cylindrical wall 3 of the drum. The periphery of each shell is rotatably mounted in a ring 7 on a standard 8 of the printing machine to permit an angular adjustment of the position of the shells 6 and 6' relative to the drum 3 for the purpose of adjusting the angular position of an arcuate array of tubular heater units 9 relative to the part of the web 10 in contact with the surface of the drum. Thus when the apparatus is mounted directly above the printing cylinder of the printing machine, by the angular adjustment of the heater array relative to the drum, the heater array may be displaced to either side of the vertical centre line of the printing cylinder at will, according to the direction in which the printed web is being delivered.

Each of the heater units 9 generally comprises a tubular housing 32 incorporating a plenum accommodating an electric heating element 34 and the tubular housing of the heater is adapted to admit air at one end thereof so that the air can be forced through the plenum over the heating element therein and thence through slots 30 in

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the housing to impinge on the web of material in the form of jets of hot air.

A plurality of parallel tubular heaters of the aforesaid type are supported between annular flanges on the two shells 6 and 6' so as to form an arcuate array covering about one third of the circumference of the drum, and in order to supply air to the tubular heaters the shell 6 at one end of the apparatus defines in conjunction with the standard 8 an inlet chamber 11 of annular shape having an inlet port 12 for the admittance of air into the chamber 11 and an outlet port 13 communicating with the end of each tubular heater 9.

The heater array is externally screened by the arcuate cover plate 18 mounted between the two shells 6 and 6' in order to confine the hot air current from the heaters 9 in the vicinity of the web.

According to the present invention the hot air subsequent to its impingement on the web of material is directed in part through the interior of the drum. This effect is achieved by providing ports 14 and 14' (FIGURE 2) in the said flanges of shells 6 and 6', respectively between the ends of each tubular heater 9 mounted thereon to permit the flow of air from the ends of the annular region between the heater array and the exterior of the drum 3 into spaces 15a and 15b defined between the shells and the ends of the drum. At the end of the drum remote from the air inlet chamber 11 the air is drawn from the said end space 15a, through the spoked wheel support 4 into and through the drum and thence into the space 15b defined between the second spoked wheel support and the shell incorporating the air inlet chamber, and at the opposite end of the drum the air is drawn directly into the space 15b between the end of the drum and the shell. The air is drawn from the latter shell into an exhaust chamber 16 disposed co-axially within the inlet chamber 11, 12 and is discharged thence to atmosphere at 21 or may be recirculated via the inlet chamber through the above described flow path.

Desirably a helical baffle 19 is mounted externally on the periphery of the exhaust chamber and is adapted to provide increased heat exchange between the hot air passing through the exhaust chamber 16 and the incoming cold air passing through the inlet chamber 11 accommodating the baffle and to more uniformly distribute the incoming air to the heater 9.

It will be appreciated that by drawing heated air subsequent to impingement on the web to be dried through the interior of the drum 3, the cylindrical wall of the drum underlying the web will be heated whereby the web 10 of material thereon is heated by conduction from the drum wall to the web in addition to the heat imparted to the web by the hot air jet from the tubular heaters 9.

The circulation or re-circulation of air through the apparatus is promoted by a blower fan (not shown) connected to the inlet chamber 11 of the casing and/or a suction fan 20 connected to the exhaust chamber 16.

Subsequent to its passage beneath the heater array the web of printed and dried material is led off the rotating drum 3 over rollers 17 to a winding cylinder or other apparatus.

What is claimed is:

1. In apparatus for drying a continuously moving printed web, a rotatably mounted hollow drum over the surface of which the web is passed with the printed side outmost, hollow air heating means externally extending generally longitudinally of the drum adjacent the drum, means for continuously introducing air to be heated into the interior of said hollow heating means, said heating means having means for discharging heated air onto the printed surface of the web passing between the drum and the heating means, means for confining and directing at least part of said heated air after impingement on the

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web into the interior of said drum to thereby heat the drum surface underlying the web, and means for continuously exhausting air from the interior of the drum.

2. In the apparatus defined in claim 1, said air introduction means and said air exhausting means being in heat exchange relation to preheat the incoming air.

3. In the apparatus defined in claim 1, said means for directing heated air into the drum comprising means for directing said heated air into an end of the drum.

4. In the apparatus defined in claim 1, said air exhausting means comprising a conduit operatively connected to one end of the drum, and the air introduction means comprising an annular passage surrounding said exhaust conduit.

5. In the apparatus defined in claim 4, a helical baffle member mounted on the exhaust conduit and extending into said passage for increased heat exchange.

6. In an apparatus for drying a continuously moving printed web of material, a hollow drum for supporting at the exterior surface thereof a part of the length of said web and being mounted for rotation about a fixed axis, a casing receiving said drum, a plurality of heaters arranged peripherally with respect to said drum within said casing with each heater having a tubular housing extending longitudinally with respect to said axis and electrical heating means in said housing, said heaters being supported by said casing adjacent to that part of the exterior surface of said drum which carries said web, means for admitting air into the interior of each of said housings to be heated by said electric heating means, means permitting the discharge of heated air from said housings in the form of jets for impingement on said web, air flow directing means including portions of said drum and said casing for confining and directing at least part of said heated air after impingement on said web into the interior of said drum to thereby heat the drum surface underlying said web, means permitting the exhaust of air from the interior of said drum, and means for forcibly circulating the air in the aforesaid manner.

7. The apparatus defined in claim 6 wherein said means for admitting air into the interior of said heaters comprises an air inlet duct in fluid communication with the interior of said casing and wherein said means permitting the exhaust of air from the interior of said drum comprises an exhaust duct in fluid communication with the interior of said drum and being disposed in heat exchange relationship with said inlet duct.

8. In an apparatus for drying a continuously moving printed web of material, a hollow drum for supporting

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at the exterior surface thereof a part of the length of said web and being mounted for rotation about a fixed axis, a casing having a pair of shells substantially enclosing the opposite ends of said drum and an arcuate cover plate supported by said shells radially outwardly of said drum, a plurality of heaters arranged peripherally with respect to said drum within said casing with each heater having a tubular housing extending longitudinally of said axis and electric heating means in said housing, means providing at least one air inlet in each of said housings for admitting air into the interior of each housing to be heated by said electric heating means, said heaters being supported by said casing adjacent to that part of the exterior surface of said drum which carries said web, means permitting the discharge of heated air from each of said housing in the form of jets for impingement on said web, air passage means in said shells for confining and directing the admission of air to be heated to the inlets of each of said housings and for confining and directing at least part of said heated air after impingement on said web into the interior of said drum to thereby heat the drum surface underlying the web, and means for continuously exhausting air from the interior of said drum, said arcuate cover plate being so disposed to confine the heated air discharged from said heaters to the vicinity of the exterior surface of said drum.

9. The apparatus defined in claim 8 comprising a shaft secured between said shells and means rotatably mounting said drum on said shaft.

10. The apparatus defined in claim 8 wherein said air passage means for confining and directing air to be heated to the inlets of said housings comprises: an inlet duct formed in one of said shells and a plurality of apertures in said one shell establishing fluid communication between said inlet duct and the inlets of said housings.

11. The apparatus defined in claim 8 comprising means adjustably rotatably mounting said casing about an axis coaxial to the rotational axis of said drum to enable adjustment of the angular position of said heaters with respect to said drum.

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