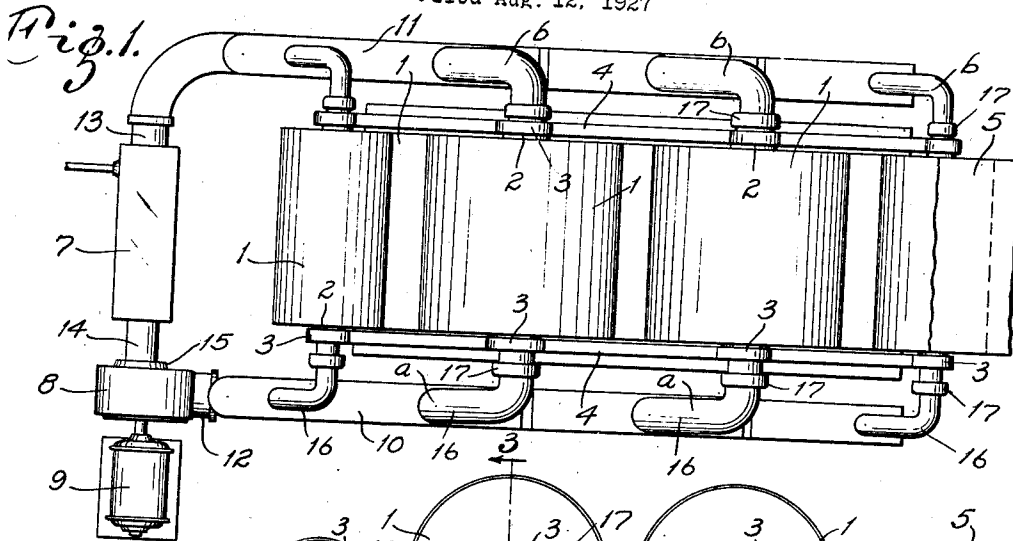
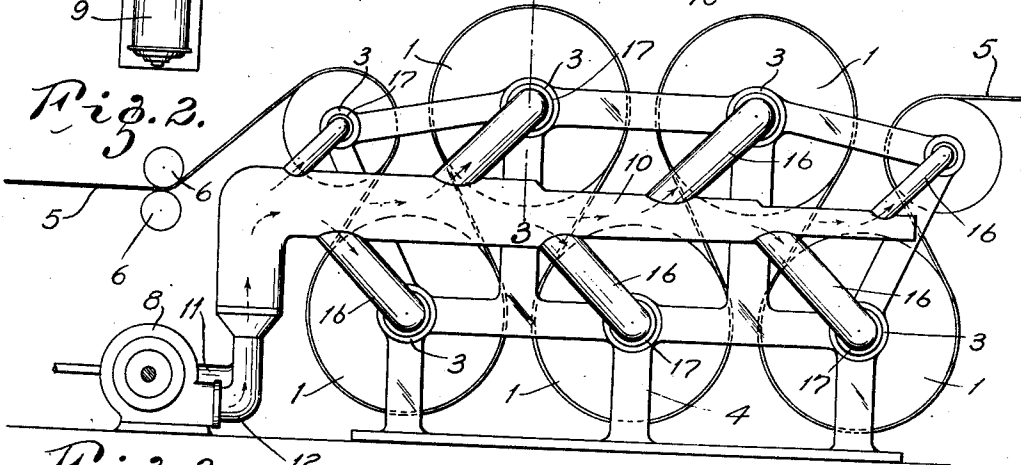
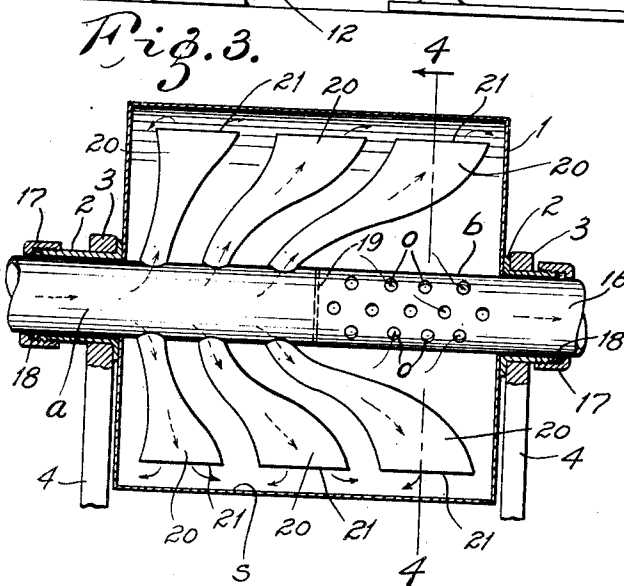
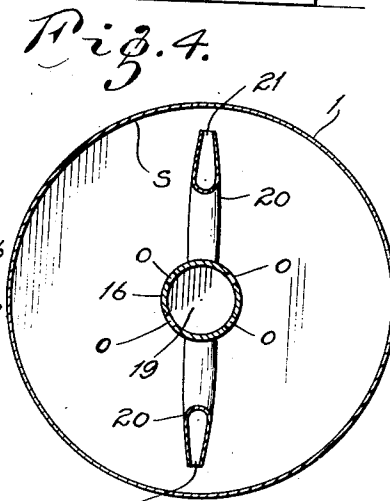


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M. J. O'MALLEY
PAPER DRYING MACHINE

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PAPER-DRYING MACHINE.

Application filed August 12, 1927. Serial No. 212,489.

My invention has relation to improvements in paper making machines, and is more particularly directed to that part of the machine wherein the paper web is dried. It consists in the novel features of construction more fully set forth in the specification and pointed out in the claims.

In paper machines of the Fordrinier type, the drying rolls, as is well understood, comprise heavy iron or steel drums which contain steam under considerable pressure, for the purpose of supplying the heat that dries the paper web. Of course, the use of steam entails a boiler and the employment of an engineer at considerable expense. Then, too, the water of condensation resulting from the circulation of steam must be taken care of as well as all other difficulties that are encountered when steam is circulated as a heating medium.

I propose to overcome such difficulties as are alluded to in drying rolls of a paper making machine by utilizing heated air as a heating medium instead of steam. Among the advantages gained by the use of air are:

1. A more rapid heating of the drying rolls, enabling the machine to be started in operation more quickly.

2. A more simple and considerably cheaper apparatus, since the rolls need no longer be built to resist steam pressure but may be made of comparatively thin sheet copper or other suitable metal; and steam pipe fitting is eliminated.

3. A safer apparatus because there is but a negligible pressure in the drums and no danger of drums blowing up because of excessive steam pressure.

Further and other advantages will be better apparent from a detailed description of the invention in connection with the accompanying drawings, in which—

Figure 1 is a top plan of a plurality of drying rolls showing my invention applied thereto; Fig. 2 is a side elevation thereof; Fig. 3 is an enlarged vertical longitudinal section taken on the line 3—3 of Figure 2; and Fig. 4 is a vertical cross-section taken on the line 4—4 of Fig. 3.

Referring to the drawings, 1, 1, 1, etc. represent drying rolls of a paper-making machine, said rolls being hollow drums preferably made of comparatively thin sheet copper, because of its high heat conductivity, each of said rolls being provided with

hollow trunnions 2, 2 on their end walls, by means of which each roll is rotatably mounted in bearings 3, 3 of supporting frames 4, 4. As is well understood in the art, the rolls are geared together so that they will rotate in unison to carry the paper web 5 smoothly and without strain over the entire set of drying rolls, and ultimately to the calender rolls 6, 6. The gearing has been omitted from the illustration for the sake of clarity, since this invention is not concerned with anything other than the means for heating the rolls.

A heating unit comprising, in the present instance, a heater 7, fan 8, and motor 9, is set up in proximity to the drying rolls, and conduits 10 and 11 are arranged adjacent to the ends of the rolls. Conduit 10 leads from the fan outlet 12 and conduit 11 leads to the inlet 13 of the heater 7, or vice versa, the outlet 14 of the heater being connected to the inlet 15 of the fan. Branch pipes 16, 16, etc. lead from the air supply conduit 10 through the trunnions 2, 2, of the respective drums 1, and thence to the return conduit 11. Thus each drum has a pipe passing entirely through it, a slight clearance being provided through the trunnions, each of which has a suitable packing nut 17 and gasket 18 to prevent leakage of the hot air from the drum (Fig. 3).

A partition 19 is fixed in each pipe 16 at the center of that part within the drum, said partition dividing the pipe 16 into a supply pipe *a* and a return pipe *b*. A plurality (in the present case three) of discharge heads 20 lead from opposite sides of the supply pipe *a*, each head 20 terminating in an elongated nozzle 21. Both rows of nozzles 21 extend along the entire length of the drum and in close proximity to the inner surface *s* thereof, so that air issuing from the nozzles will impinge on the inside drum surface along two lines oppositely disposed. As the drums revolve, the pipes 16 remaining stationary, the hot air issuing from the nozzles will, of course, be discharged against the entire inner surface of the drums. While I have shown but two sets of discharge heads 20, obviously any desirable number of sets may be used.

The heated air that is discharged from the nozzles 21 escapes into the drum 1 from where it is forced, by the oncoming air, through a plurality of perforations *o*, *o*

etc. in the return side *b* of the pipe 16. From the pipe 16 the used air returns to the heater through conduit 11.

Thus a continuous circulation of hot air passes into and through the drums.

Having described my invention, I claim:

1. In a paper drying machine, a drying roll over which the paper is adapted to pass, said roll comprising a hollow drum of sheet metal construction, a source of heated air supply, a conduit leading from said source of supply into the drum and back to said source, a partition in the conduit within the drum, nozzles leading from the conduit on one side of said partition and adapted to discharge air against the inside surface of the drum, the conduit having inlet openings

on the opposite side of the partition, and means for circulating the air.

2. In a paper drying machine, a drying roll comprising a hollow drum over which the paper is adapted to pass, an air heater, an air conduit leading from the heater into said drum, said conduit having elongated discharge nozzles in close proximity to the inside cylindrical wall of the drum and extending longitudinally thereof adapted to discharge a thin sheet of heated air against said wall, an outlet conduit for the spent air, and means for continuously circulating the air.

In testimony whereof I hereunto affix my signature.

MICHAEL J. O'MALLEY.