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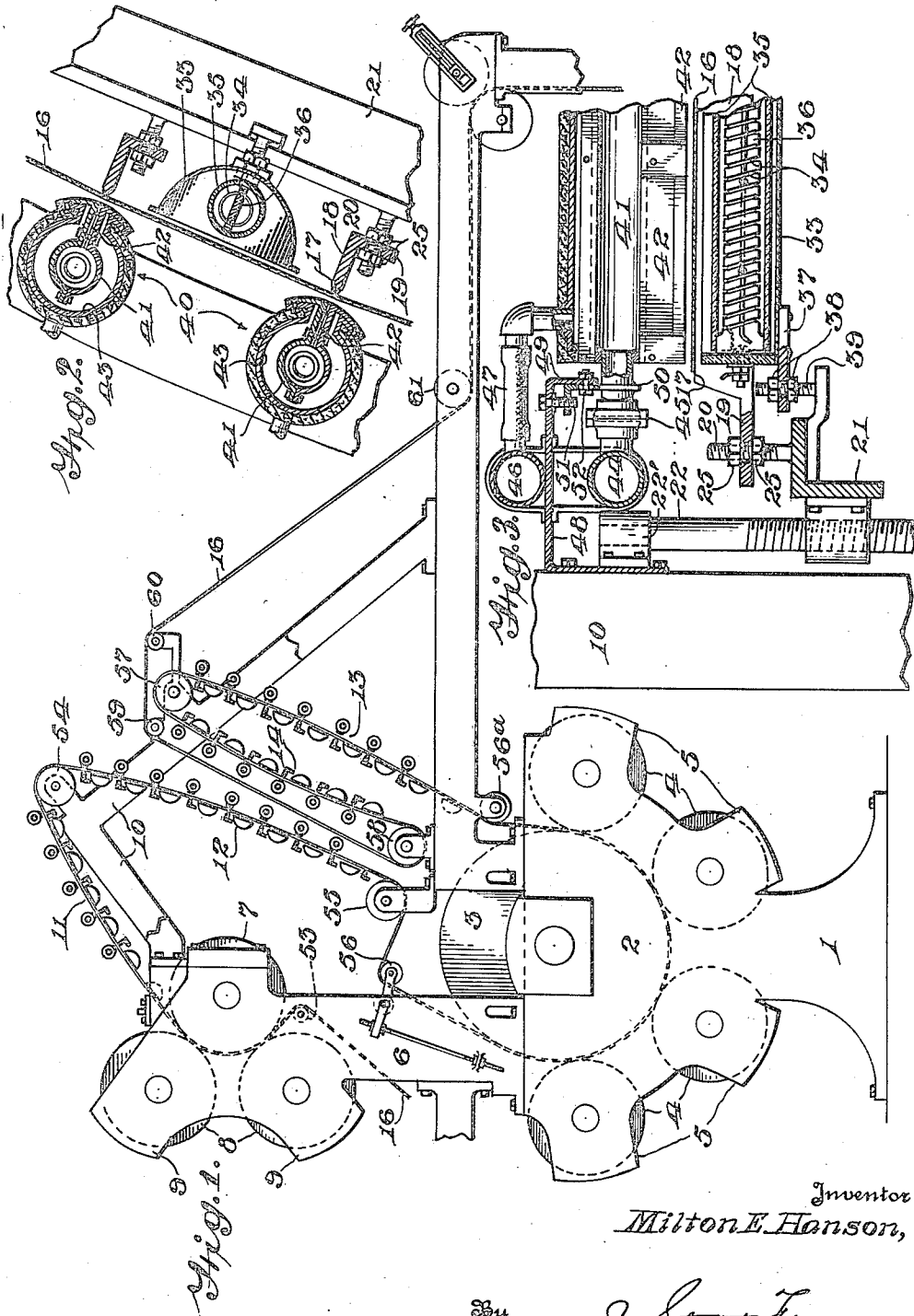
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2,065,070

APPARATUS FOR DRYING MATERIALS APPLIED TO SHEETS

Filed Jan. 29, 1931.

2 Sheets-Sheet 1



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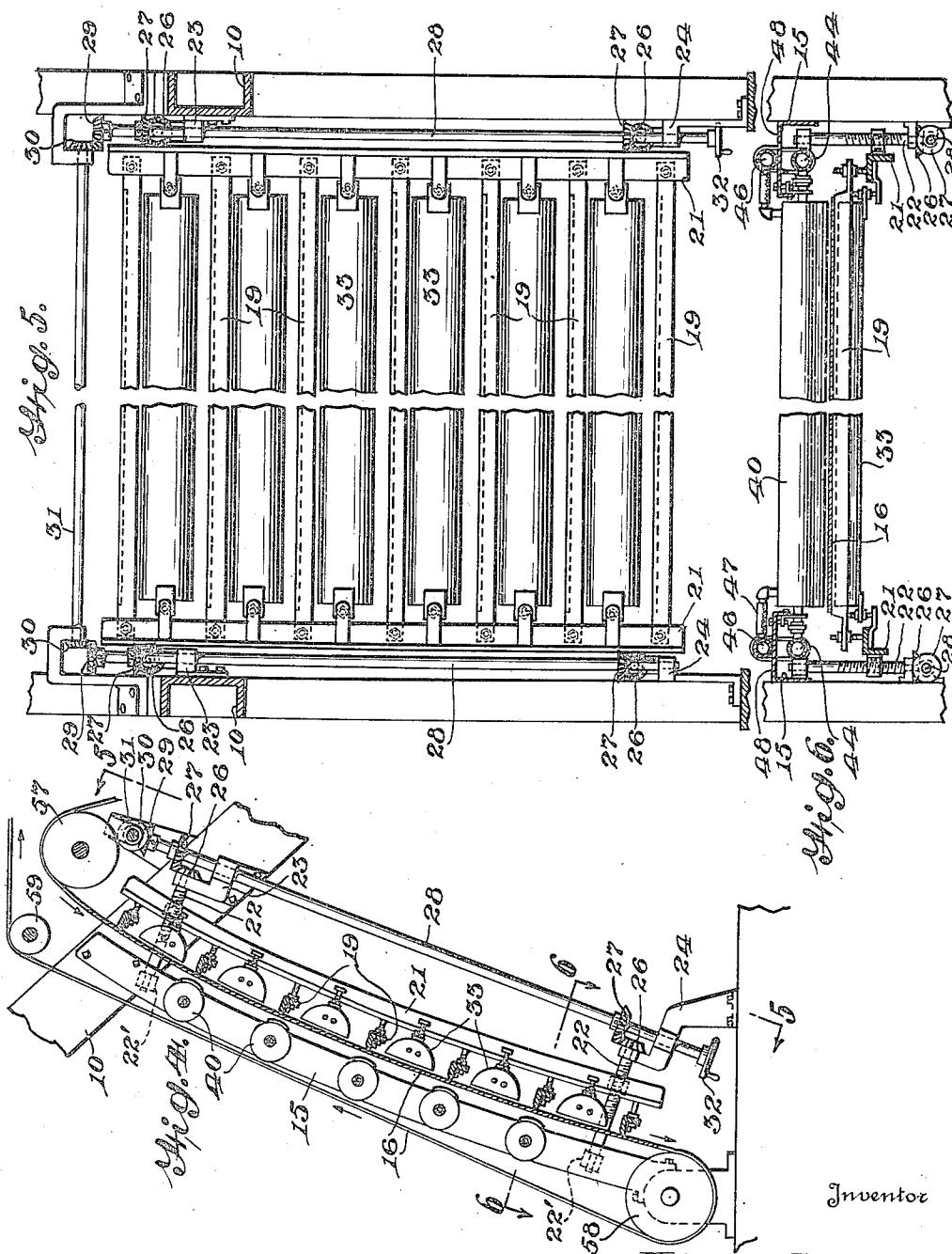
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APPARATUS FOR DRYING MATERIALS APPLIED TO SHEETS

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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APPARATUS FOR DRYING MATERIALS
APPLIED TO SHEETSMilton E. Hanson, Collingswood, N. J., assignor
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Application January 29, 1931, Serial No. 512,077

5 Claims. (Cl. 101-416)

The object of the invention is to provide improvements both in the apparatus for drying materials applied to such articles as sheets or webs of paper and textile products of various forms.

Such materials comprise the inks used in applying one or more colors upon paper as in offset printing, and the inks or dyes used in applying designs to textile fabrics, the applied materials comprising coatings for the whole or a part of the surface of the printed paper or textile, or partial or complete impregnation or saturation of the paper or textile as in the preparation of oilcloth and linoleum, the coating of leather, waterproofing of fabrics, etc.

As hereinafter employed, the term drying is intended to cover in addition to mere evaporation all forms of setting, hardening, oxidizing, colloidal thickening, molecular redistribution and/or polymerization of the material applied to the sheet or web in whatever manner. These forms of drying or setting are probably in every instance accelerated by either or both heat and oxidation, but are effected to a far greater degree and much more rapidly by applying both heat and free oxygen to the said material.

Another object involves the apparatus and is to provide mechanism which may be attached to or made a part of a printing press or other machine in which the method is to be carried out, such mechanism primarily constituting means for causing heat to penetrate the base material, such as continuous webs or sheets, and though the method may be applied to bodies for which a partial or complete coating or impregnation is desired, said mechanism also comprising means to efficiently apply oxygen (as in the form of ozone) or other suitable fluid to the heated surface of such web, sheet, etc., and means to maintain the base material when necessary free from wrinkles or other surface irregularities.

A further object is to provide an improved apparatus for carrying out a method which consists in applying to one side of a web or sheet one or more impressions which may be of the same or different nature as to color, composition, penetration qualities, or otherwise, heating the web and while heated subjecting its treated surface to a current of ozone or other oxidizing fluid, or in fact any other fluid agent to produce any drying effect within the broad scope of the term "drying" as above defined, such treatment being without substantial delay, applying to the opposite side of the web one or more additional impressions of the same or of some other nature,

again heating the web, and while heated subjecting the last treated surface to a current of ozone or other fluid, said method also covering fewer than the full number of foregoing steps, as for instance stopping with the ozone or other fluid treatment of the first side of the web.

With these and other objects in mind, the present invention comprises further details of construction and operation which are fully brought out in the following description, when read in conjunction with the accompanying drawings, in which Fig. 1 is a side elevation of a printing press equipped with one embodiment of the invention for carrying out the improved method or process, portions of the press being broken away; Fig. 2 is an enlarged longitudinal section of a portion of the said embodiment; Fig. 3 is a transverse section of the same; Fig. 4 is a partial sectional, partial side elevational view of a portion of the structure shown in Fig. 1; and Figs. 5 and 6 are sections on the lines 5-5 and 6-6, respectively, of Fig. 1.

Referring to the drawings, the invention is illustrated as being applied to any representative type of printing press adapted to handle a continuous web (or for handling separate sheets, as may be desired), said press applying any desired number of color impressions to one side of the web, after which any desired number of such impressions may be applied to the other side of the web. When more than one impression is applied, there is probably always involved the association of two or more different colors which must be accurately registered with respect to each other.

In the printing press illustrated, one of a pair of oppositely disposed frame members is shown as comprising a base portion 1, having an enlarged head 2, which in turn rotatably supports a centrally positioned platen roll 3, about which are also rotatably positioned a plurality of impression rolls 4, rotatably carried by radial extensions 5 from said frame head. Projecting upwardly from and supported by said head is an extension 6, which rotatably supports a second platen roll 7, and a plurality of impression rolls 8, rotatably carried by projections 9 from said extension. Angularly related frame members 10 fixedly support drying or setting devices 11, 12, 13 and 14, which are hereinafter described in detail and are more fully illustrated in Figs. 2 to 6.

In Figs. 2 to 6, the drying mechanism 14 is shown in detail and also represents each of the similar elements 11, 12 and 13. Unitary portions 15 of the press frame are arranged in

the proper position and relationship with respect to the path traveled by the web or sheet 16, which path through the drying mechanism is preferably curved to the proper degree, so that with the usual tension upon the sheet or web it is maintained free from wrinkles or other undesirable irregularities. This path is defined by a series of edges 17 with which the flanges 18 of as many angle bars 19 are provided, said edges individually offering but slight friction to the web and being rounded to the proper degree to prevent cutting or tearing of the web.

The respective angle bars are adjustably carried by threaded studs 20 in turn carried by spaced rods 21, the opposite end portions of which are adjustably carried by threaded shafts 22, extending between bearings 22' carried by the frame portions 15 and brackets 23 and 24, attached to other portions of the press frame. The adjustment of each angle bar with respect to the stud-supporting rods is maintained by nuts 25 carried by each stud 20 upon the opposite sides of the adjacent bar, and the uniform adjustment of the said rods is maintained as follows:—Each shaft carries a bevel gear 26 meshing with similar gears 27 upon equalizing shafts 28. These last-named shafts are provided with bevel gears 29, meshing with similar gears 30 carried by a connecting shaft 31, and one or both of the said equalizing shafts is provided with a hand wheel 32.

Between adjacent angle bars 19 are positioned radiant heaters, comprising concave reflectors 33 within which are positioned luminous resistor units 34, preferably surrounded by transparent shields 35 and supported by relatively thin strips 36, which offer a minimum resistance to the generation of and emission of heat from within said reflectors. Each heater is provided at its opposite ends with extensions 37, which are adjustably maintained by nuts 38 upon studs 39 carried by the spaced adjustable rods 21, so that each heater may be readily adjusted with respect to the plane of the two angle bars between which it is located and thereby with respect to the path of the web or sheet, while upon rotation of the hand wheel 32 the several heaters are shifted simultaneously with the several angle bars towards or away from the normal path of the web or sheet, their relative adjustment being maintained.

Upon the opposite side of and adjacent to the said path is positioned a series of fluid applicators 40, described in applicant's copending application Serial No. 512,079, which has matured into Patent No. 1,924,120, dated Aug. 29, 1933, and adapted to discharge oxidizing and/or other fluids directly upon the adjacent surface of a web or sheet passing across said angle bars and while being warmed by said heaters. Said applicators are preferably supported by the frame element 15 and in each case primarily comprise a tube 41, having longitudinally and radially extending lateral slots 42 which serve as nozzles for the escape of fluid from the tube, which is surrounded by a casing 43 through which a suitable cooling substance is adapted to flow for maintaining the proper temperature of the fluid until it is discharged from said nozzles. The tube is connected at its opposite ends to supply pipes 44 through suitable universal joints 45, while the interior of the casing is connected to supply and outlet pipes 46 through flexible connections 47.

Each of the said applicators is adjustably

mounted upon the press frame portion 15 through the medium of bracket extensions 48 which also carry the supply pipes 44 and 46. The free end portion of each such bracket is angularly deflected at 49 and has normally secured to it a bracket 50 carried by the adjacent end of the applicator, said brackets being relatively adjustable by means of set-screws 51 and being maintained in the desired adjustment by bolts 52. Thus, the said applicators may be individually adjusted towards and away from one side of the path of the web or sheet independently of the adjustment of the angle guide bars and heaters towards and away from the opposite side of said path.

In the operation of a press or other mechanism equipped with this improved apparatus, the web in this case comes from a roll (not shown) and passes over an idler 53, thence over the surface of the platen roll 7, where one side of the web receives impressions from the rolls 8. The web then passes through the first drying mechanism 11, over an idler 54 and through the second drying mechanism 12, over an idler 55, over a tensioning roll 56 and around the second platen roll 3, at which time the opposite side of the web receives subsequent impressions from the rolls 4. The web then passes over an idler 56^a, through the drying mechanism 13, over the idler 57 and through the last of said drying mechanisms 14, after which it passes over idlers 58, 59 and 60 and thence over a tension roll 61 and on to any desired form of cutting, folding, and/or other mechanisms.

Regarding the adjustment of the fluid applicators, the angle bars and intermediate heaters, it will be evident that adjustment of the first is for the purpose of applying the drying or other fluid as closely as possible to but without touching the moving web, adjustment of the second is to provide a path of the correct degree of curvature through the drying mechanisms, and adjustment of the third is to bring the heat as close to the moving web as possible without said web touching the heater. However, as the normal positions of these elements are quite close to the path of the web, it would be difficult to thread the web through the several mechanisms, were it not that by rotating the hand wheel 32 the angle bars and heaters may be withdrawn from and into sufficient spaced relation with respect to said path, without destroying the relative adjustments of the individual bars and heaters.

After the proper adjustments have been made, the heaters sufficiently heated, and the correct flow of drying and/or other fluid provided through and from the applicators, the press may be operated in the usual manner, with the result that the substance applied to one side of the web by the rolls 8 is dried while passing through the drying mechanisms 11 and 12, before that side of the web comes into contact with the platen 3 and receives subsequent impressions upon its opposite surface from the rolls 4, these last impressions being dried as the web passes through the drying mechanisms 13 and 14, before continuing on to the cutting, folding and/or other mechanisms.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:—

1. In a machine for applying a substance to a sheet or web, spaced adjustable means defining other than a rectilinear path through which a sheet or web is adapted to travel, means to heat

such sheet or web and the substance carried thereby, and means to apply a drying fluid to the surface of such sheet or web while in said path and carrying such substance.

5 2. In a machine for applying a substance to a sheet or web, spaced adjustable means defining a path through which a sheet or web is adapted to travel, radiant means to heat such sheet or web and the substance carried thereby, and
10 means to apply a drying fluid to the surface of such sheet or web while in said path and carrying such substance.

3. In a machine for applying a substance to a sheet or web, spaced means defining other
15 than a planular path through which a sheet or web is adapted to travel, radiant means positioned between said first means to heat such sheet or web and the substance carried thereby, and means upon the opposite side of such path to
20 apply a drying fluid to the surface of such sheet or web while in said path and carrying such substance.

4. In a machine for applying a substance to a sheet or web, spaced adjustable means defining a path through which a sheet or web is adapted to travel, adjustable means to heat such sheet or web and the substance carried thereby, and 5 means adjustable towards and away from such path to apply a drying fluid to the surface of such sheet or web while in such path and carrying such substance.

5. In a machine for applying a substance to a 10 sheet or web, spaced adjustable means defining other than a planular path through which a sheet or web is adapted to travel, adjustable radiant means positioned between said first means to heat such sheet or web and the substance car- 15 ried thereby, and means upon the opposite side of such path and adjustable towards and away from such path to apply a drying fluid to the surface of such sheet or web while in such path and carrying such substance. 20

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