Jan. 15, 1957 J. C. THOMAS ET AL 2,777,312

APPARATUS FOR HANDLING A PRINTED FABRIC WEB DURING DEVELOPMENT OF THE PRINT COLORS THEREON

Filed March 5, 1956 3 Sheets-Sheet 1

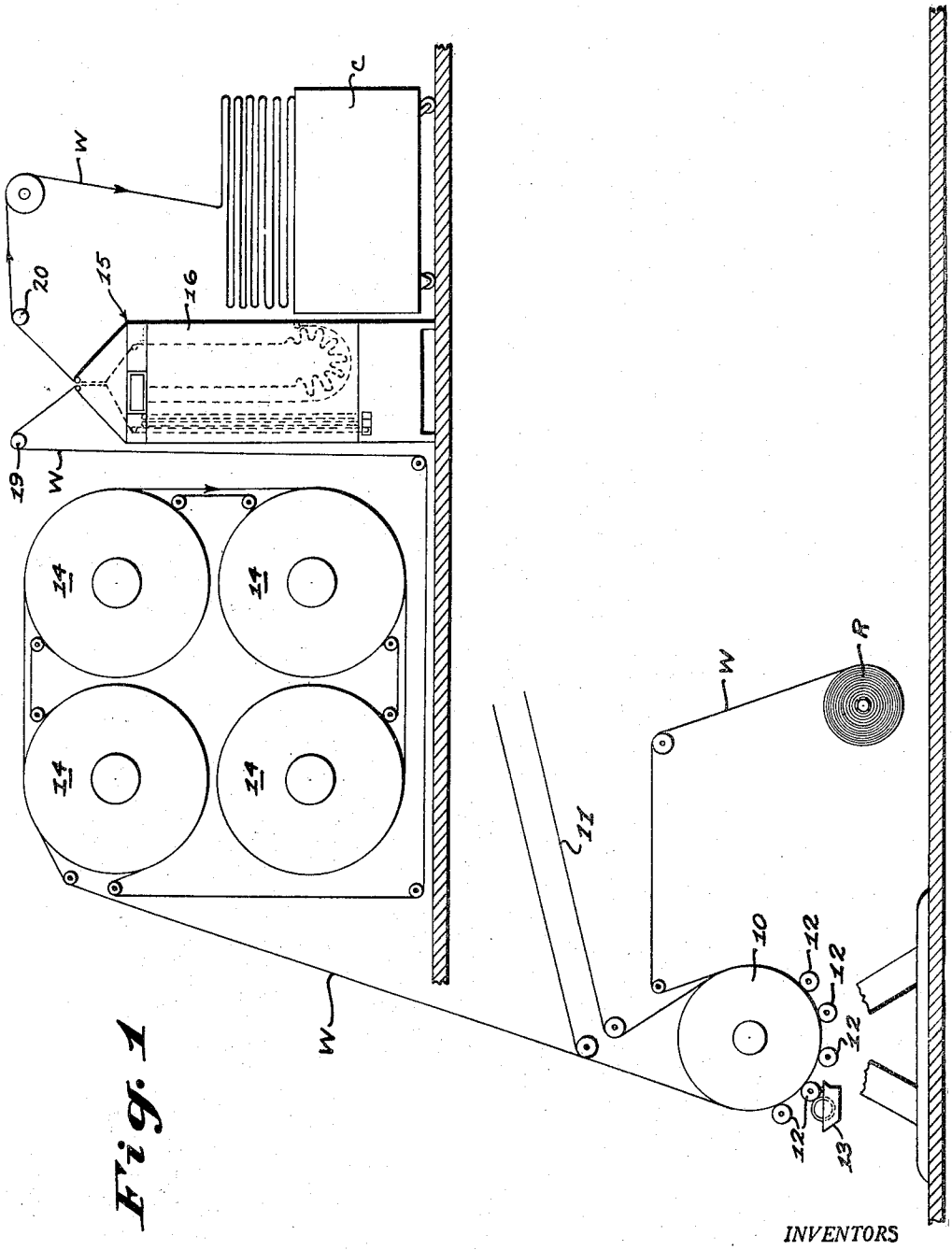


Fig. 1

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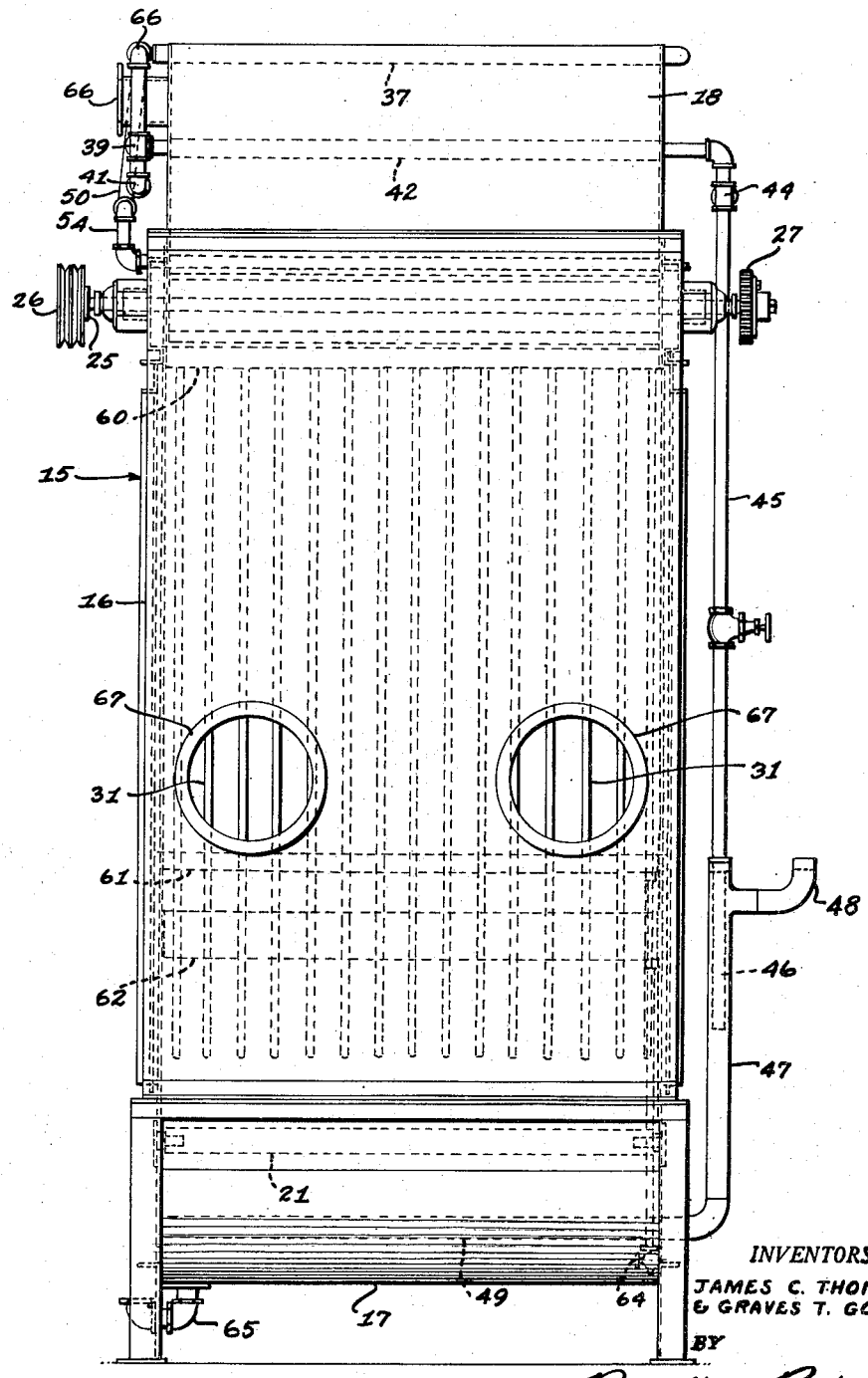
Parrott & Richards
ATTORNEYS

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Fig. 3



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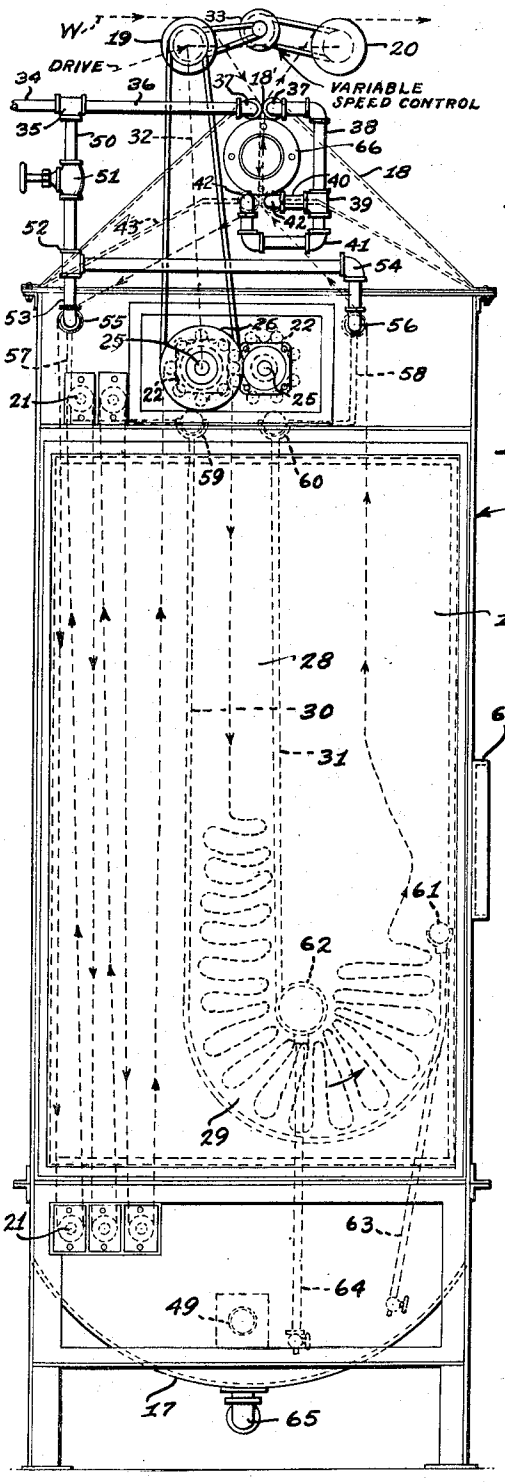


Fig. 2

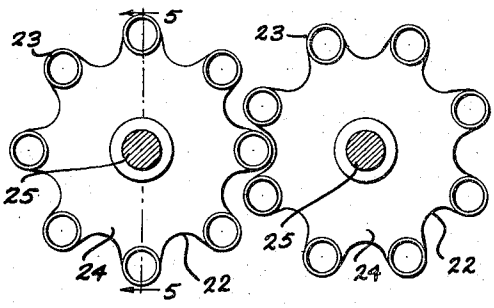


Fig. 4

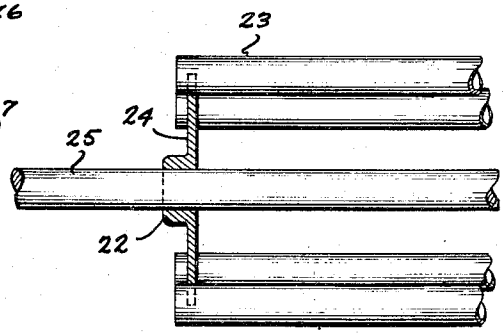


Fig. 5

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2,777,312

APPARATUS FOR HANDLING A PRINTED FABRIC WEB DURING DEVELOPMENT OF THE PRINT COLORS THEREON

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Application March 5, 1956, Serial No. 569,630

2 Claims. (Cl. 68—5)

This invention relates to the development or aging of textile print colors of the type that require treatment with steam and acid vapors for development after printing, and more particularly to an improved apparatus or means for carrying out the developing treatment that may be employed effectively to develop print colors during the printing operation, and that is much simpler and smaller and less expensive than the aging equipment now commonly in use so as to provide very substantial operating economies.

Heretofore it has been conventional practice to age print colors in a separate operation following printing of the colors, the printed fabric webs being transferred from the print machines and subsequently aged in a separate handling step. The equipment employed for this separate aging step, although normally arranged for handling several printed webs at a time (i. e., about four webs) has characteristically been quite large and expensive, the usual aging equipment being about twenty-four feet long, with a height of about eight or nine feet and a width of about five feet.

The aging means provided according to the present invention has a comparable height and width, but requires a length of only about thirty-six inches, so as to provide a reduction of at least 50% in floor space requirements even though it is arranged for treating only one printed web at a time. In addition, because the aging means of the present invention can be employed for aging the print colors during the printing operation, it can be located within the space normally set aside, in any event, for the printing machine installation so as in effect to require no additional floor space at all for the aging step.

Moreover, the aging means of the present invention, because of its smaller size, requires substantially less structure for training the printed web through the aging step and accordingly allows a very substantial reduction in first cost for the aging equipment, as well as providing for a more advantageous supervision of the aging treatment in direct relation to the printing operation and affording an immediate check on the printing operation by developing the print colors as they are printed so that any defects in the printed pattern become apparent immediately and can be corrected before any substantial amount of goods have been printed containing this defect.

These and other features of the present invention are described in further detail below in connection with the accompanying drawings, in which:

Fig. 1 is a diagrammatic illustration of a printing machine installation incorporating an aging means arranged according to the present invention;

Fig. 2 is an enlarged end elevation of the aging means shown in Fig. 1;

Fig. 3 is a right side elevation corresponding to Fig. 2;

Fig. 4 is an enlarged end detail of the pair of reel rolls preferably employed in the aging means for feeding the print goods during aging; and

Fig. 5 is a fragmentary sectional detail taken substantially on the line 5—5 in Fig. 4.

Referring now in detail to the drawings, Fig. 1 illustrates a usual printing machine arrangement in which the printing cyclinder is shown at **10** with a fabric web W drawn from a supply roll R trained therearound over the usual rubber printing blanket **11** past a series of printing rolls **12**, each of which are conventionally supplied with a print color from a color box or fountain such as is indicated at **13**. After application of the print colors by the printing rolls **12**, the web W is then trained from the printing cylinder to a series of drying cans **14** about which it is wrapped successively to effect adequate drying of the applied print colors.

Upon leaving the drying cans **14**, the web W, according to prior practice, has normally been discharged directly into a storage cart C, such as is illustrated in Fig. 1, so that it may be transferred for separate handling through the aging step. According to the present invention, however, the web W is taken directly from the drying cans **14** through an aging means, as indicated generally by the reference numeral **15** in Fig. 1, so that it is completely aged upon reaching the storage cart C and does not require the separate handling for this purpose that has heretofore been necessary.

The arrangement of the aging means **15** of the present invention is shown more in detail in Figs. 2 and 3 of the drawings in which it is illustrated as comprising an enclosed frame structure **16** forming a treating chamber having a rounded bottom **17**, to provide for drainage, and a peaked top **18** terminating at a relatively narrow slot opening **18'** through which the web W is received for development and discharged after development. As thus arranged, the aging means **15** may be located to receive the web W from one of the web handling rolls **19** of the printing machine and to discharge it to a succeeding web handling roll **20**.

The web W upon being received within the aging means **15** is directed first to a series of idler rolls **21** over which it is festooned to dispose the web W initially so that it may become saturated with the steam and acid vapors that are maintained in the treating chamber **16**, as is described more in detail further below, and have the development of the print colors thereon commenced and partially accomplished as a result of this vapor saturation. The web W is drawn over these idler festooning rolls **21** by a pair of reel rolls **22** that are formed, as shown best in Figs. 4 and 5, with spaced reel bar members **23** secured peripherally on spider end plates **24** and arranged on mounting shafts **25** so that the pitch circles of the bar members **23** are disposed tangent. The mounting shaft **25** for one of the reel rolls **22** is fitted at one end with a drive pulley **26** and is connected at its opposite end through a geared connection at **27** to the other mounting shaft **25** so that the reel rolls **22** are driven in timed relation with the respective bar members **23** staggered and intermeshing, although remaining free of engagement, to provide adequate traction on the web W for drawing it over the idler festooning rolls **21**

These reel rolls **22** also serve to deliver or feed the saturated and partially developed web W into a succeeding portion of the aging means **15** in which its rate of travel is slowed appreciably to allow time for complete development of the print colors before the web W is discharged from the treating chamber **16**. The above described arrangement of the reel rolls **22** is of further particular advantage in this respect, because the web W must be turned loose in order to slow its rate of travel and, as it has become saturated with the stream and acid vapors so as to be damp, it would tend to wrap and become fouled at this point in most usual types of feed roll arrangements,

whereas the reel rolls 22 act to turn free nicely a hanging length of the web W because they afford no substantial surface to which it can cling.

The succeeding portion of the aging means 15 in which the rate of travel of the web W is slowed to allow for complete aging is arranged to incorporate a J-tube structure having entrance leg and foot portions 28 and 29 thereof formed by spaced rod elements 30 and 31, this J-tube structure being disposed with its entrance leg portion 28 depending vertically below the reel rolls 22 so that a slack length of the web W will tend to plait in the J-tube foot portion 29, as illustrated in Fig. 2, and will feed around this foot portion 29 only from the weight of the plaited web as it builds up in the entrance leg portion 28, so as to accumulate a substantial length of the web W in the foot portion 29 and reduce its rate of travel very substantially. It will be noted that the spaced rod elements 30 and 31 employed to form the J-tube structure are arranged to extend in the direction of travel of the web W through the structure, and they serve the particularly useful purpose of providing a guiding action for the plaited portion of the web W that supports the accumulated web laterally and maintains it properly aligned in the direction of travel. These rod elements 30 and 31, as is the aging means 15 generally, are preferably formed of polished stainless steel so as to provide for smooth progress of the plaited portion of web W through J-tube foot portion 29, and these rod elements 30 and 31 are also preferably tubular in form so that they can be connected for steam heating to prevent any condensation of the treating vapors thereon and to ease further the travel of the plaited web W thereover.

Beyond the J-tube foot portion 29, the web W is taken away for discharge from the aging means 15 by the pull thereon of the previously mentioned web handling roll 20 of the printing machine in relation to which the aging means 15 is located. It will be recognized that the web W as received by the aging means 15 from the web handling roll 19 of the printing machine will be traveling at the printing speed, and that the reel rolls 22 must pull the web W over the idler festooning rolls 21 at this same speed. For this purpose, the reel rolls 22 have the drive pulley 26 thereat connected for driving, as indicated at 32 in Fig. 2, from the web handling roll 19, which will in turn be driven for carrying the web W at the printing speed, as normally arranged in the printing machine installation. The discharging web handling roll 20 is also connected for driving from the web handling roll 19, but this connection incorporates a variable speed control, as indicated in Fig. 2 at 33, by which the roll 20 can initially be slowed so as to allow a desired length of the web W to accumulate in plaited form at the J-tube foot portion 29, and then readjusted to the printing speed so as to maintain the accumulated web length within the aging means 15 substantially constant. By this arrangement, the aging means 15 can be operated to provide an aging time of from about one to five minutes, with the portion of this time ahead of the reel rolls 22 varying from about 10 to 60 seconds depending upon the particular printing speed.

The steam supply to the aging means 15 is arranged so as to heat all stationary web contacting surfaces and thereby maintain these surfaces free of condensation, as well as to supply steam vapor as a carrier for acid vapor in maintaining a treating atmosphere within the chamber 16. For this purpose, the steam supply line is shown at 34 in Fig. 2 connected through a T fitting 35 from which one leg 36 runs to tubular draw bars 37 arranged to form the entrance slot 18' in the peaked top 18 of the aging means chamber 16. The steam supply leg 36 is connected at one end of the adjacent draw bar 37, and this adjacent draw bar 37 is in turn connected at its opposite end to the other draw bar 37 so that steam is supplied through both of them in series and is then piped therefrom through a connection at 38 to a T fitting 39 from which branches 40 and 41 run, respectively, to a second pair of draw bars 42 located vertically below the first pair 37 to form a second entrance slot through a baffle hood 43 aranged within the peaked top 18 of treating chamber 16 to retard the rate of discharge of treating vapors therefrom. At their opposite ends this second pair of draw bars 42 is connected through a T fitting 44 (see Fig. 3) to a conduit 45 running to an injector jet 46 disposed within a stand pipe 47 having a filler leg 48 at which acid may be introduced for vaporization and introduction to the treating chamber 16 through a perforated vapor distributor 49 by the action of the steam jet 46.

The other branch 50 of the steam supply line from the T fittings 35 extends through a throttle valve 51 to a further T fitting 52 at which it branches into separate legs 53 and 54 to further stationary draw bars 55 and 56, respectively, over which the web W is trained for directing it to the idler festooning rolls 21 in one case and from the J-tube foot portion 29 in the other. These draw bars 55 and 56 are in turn connected at 57 and 58 to manifold headers 59 and 60 for the J-tube rod elements 30 and 31, respectively, that in turn terminate at lower headers 61 and 62, each of which are fitted with drain lines 63 and 64 arranged to discharge at the rounded bottom 17 of the treating chamber 16 for draining therefrom through a suitable drain trap 65. The treating chamber 16 is also fitted with an exhaust port 66 at its peaked top portion 18 above the baffle hood 43 therein, the exhaust port 66 being provided for connection to a disposal stack or other comparable means for taking off the spent treating vapors. Also, the treating chamber 16 may be fitted with inspection windows as at 67 and any other conventional operating conveniences desired.

The aging means 15 arranged as described above may be operated with a supply of process steam, and the aging operation is carried out within the treating chamber 16 at substantially atmospheric pressure and at a temperature substantially at but not more than 212° F. The acid vapors used in the treating atmosphere are conventionally vapors of acetic acid using an 84% commercial grade acid diluted in equal parts by volume with water. During normal operation, the steam injection and acid vapor introduction is maintained continuously at a rate sufficient to obtain a slight bleeding of steam from the entrance slot 18' at the peaked chamber top 18.

The present invention has been described in detail above for purposes of illustration only and is not intended to be limited by this description or otherwise except as defined in the appended claims.

We claim:

1. Apparatus for aging a printed fabric web to develop print colors thereon that require development by steam and acid vapor treatment after printing, said apparatus comprising a treating chamber, means for maintining a developing atmosphere of steam and acid vapor in said chamber, and means for plaiting a substantial length of said web in said chamber and thereby slowing its rate of travel sufficiently for complete color development within said chamber while allowing said web to be continuously delivered to and discharged from said chamber at a relatively rapid rate, said plaiting means comprising a J-tube structure having entrance leg and foot portions formed by spaced tubular elements, said entrance leg portion being arranged vertically in said chamber for receiving said web and directing it in plaited form to said foot portion under the weight of plaited web standing in said leg portion, and means to direct steam through said tubular elements and thereby heat said elements so as to prevent condensation thereon of vapor from said developing atmosphere.

2. Apparatus for aging a printed fabric web comprising a treating chamber for containing an aging vapor atmosphere, and means for plaiting a substantial length of a printed fabric web in said chamber, said plaiting means

having entrance leg and foot portions formed by spaced tubular elements arranged in two parallel rows that extend transversely of said chamber in an extent at least equal to the open width extent of said web, said entrance leg portion being arranged vertically in said chamber for receiving said web and directing it in plaited form to said foot portion under the weight of plaited web standing in said leg portion, and means for heating said tubular elements internally so as to prevent condensation thereon of vapor from said aging atmosphere.

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