

Feb. 28, 1950

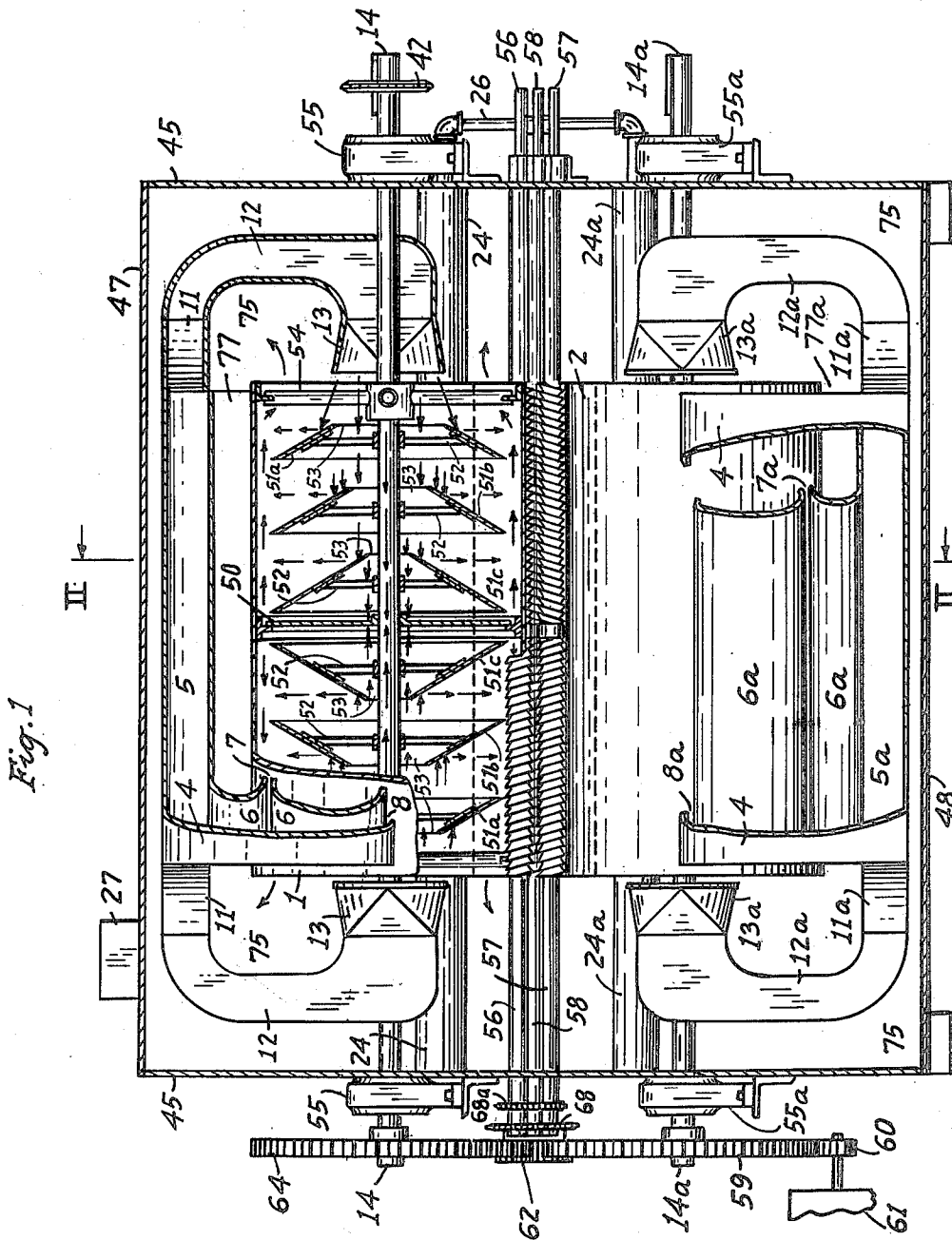
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HEAT-TREATMENT OF WEBS OF TEXTILE MATERIALS

Filed Dec. 9, 1947

4 Sheets-Sheet 1



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HEAT-TREATMENT OF WEBS OF TEXTILE MATERIALS

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4 Sheets-Sheet 2

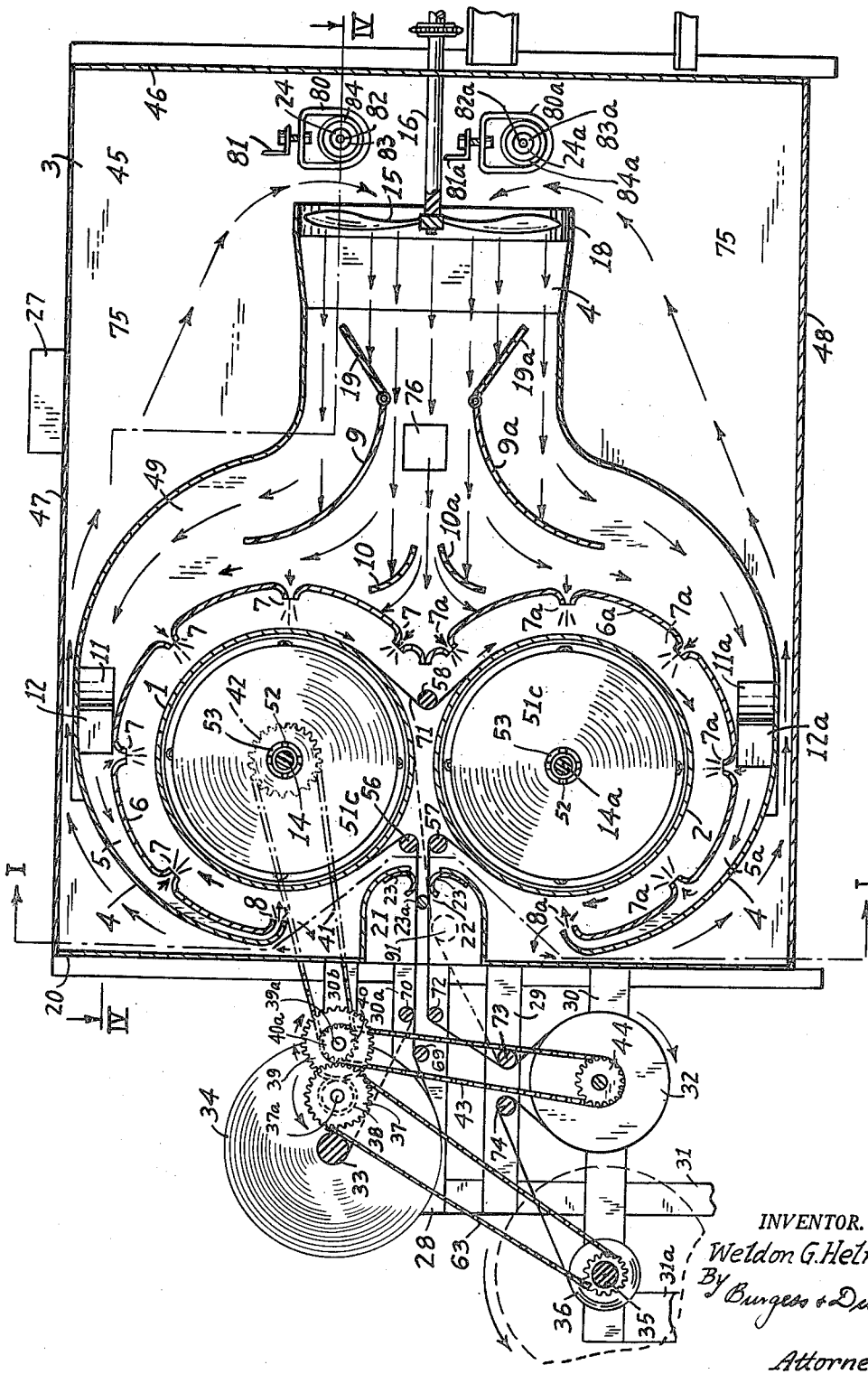


Fig. 2

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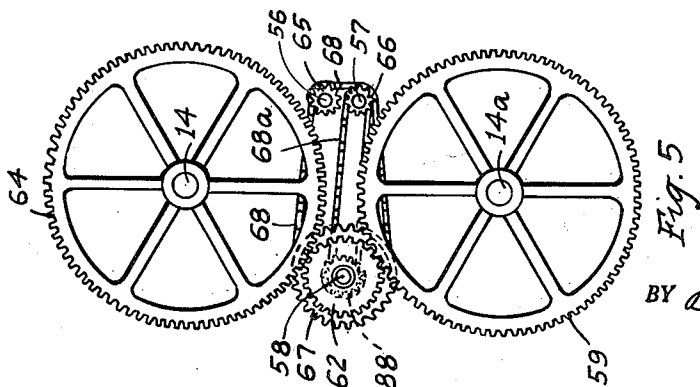
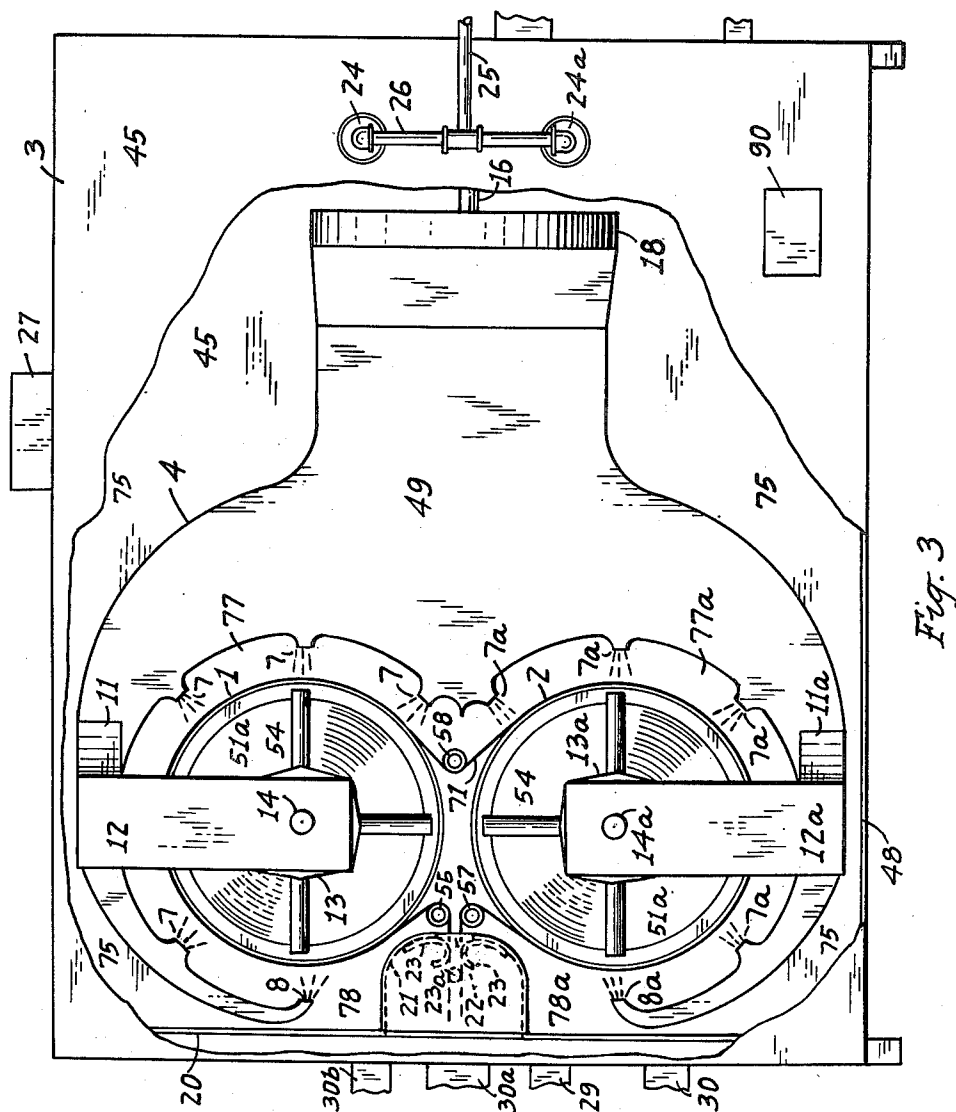
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HEAT-TREATMENT OF WEBS OF TEXTILE MATERIALS

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4 Sheets-Sheet 3



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HEAT-TREATMENT OF WEBS OF TEXTILE MATERIALS

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4 Sheets-Sheet 4

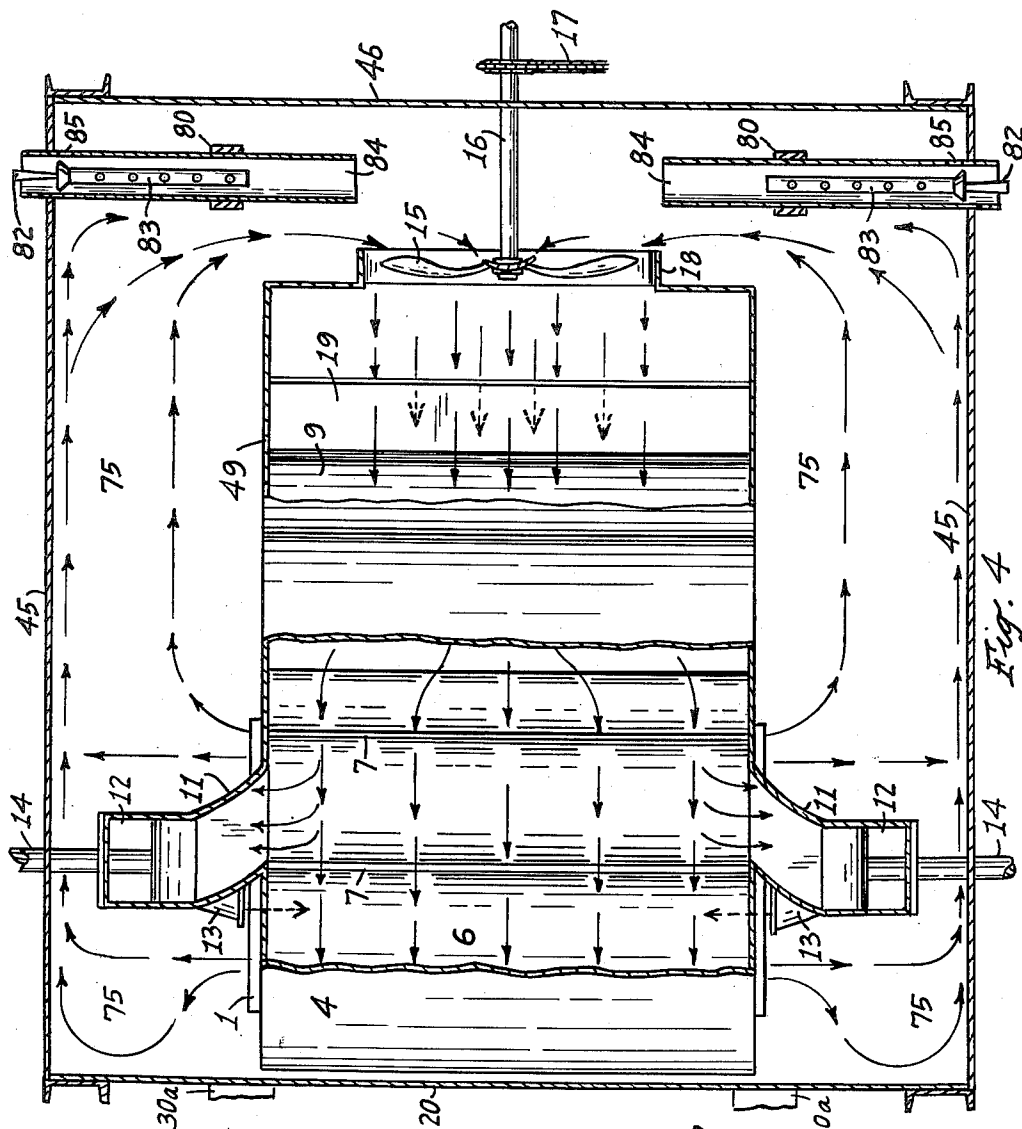


Fig. 4

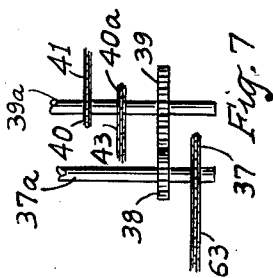


Fig. 7

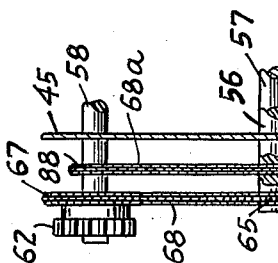


Fig. 6

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HEAT-TREATMENT OF WEBS OF
TEXTILE MATERIALS

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17 Claims. (Cl. 34—114)

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This invention relates to new and useful improvements in the heat-setting of textile materials.

Certain woven fabrics consisting of or containing fibers made of certain synthetic materials, and notably polyamides, are deficient, inter alia, in hand, drape and resilience. In order to overcome such deficiency and improve the characteristics of these fibers, particularly with a view of putting to use the otherwise advantageous properties thereof, such as strength of fiber and elasticity, a "setting" treatment is resorted to. This setting treatment as hitherto practiced usually comprises a finishing step for the fabric, consisting of or containing synthetic polyamide fiber, and involves the heating of the fabric by pressing the same against a heated surface with substantially constant pressure between the fabric and the heated surface until the temperature of the fabric reaches a point just below the fusion point of the polyamide. Usually this involves heating of the fabric to an excess of 190° C. up to a temperature ordinarily not substantially exceeding 5–25° C. below the fusion point of the polyamide. The heating of the fabric under pressure to within the desired or preferred temperature or temperature range for the particular specific type of polyamide is ordinarily of short duration in the order of not exceeding 60 seconds. Many of the polyamides can be satisfactorily set, however, at the treating temperature within a period of the order of, for instance, 10–15 seconds. The treating conditions are critical in their interrelation within relatively confined limits and relatively small increases beyond these limits of the heating period, treating temperatures or pressure may seriously impair the strength of the fibers.

Various means have been proposed in the past to accomplish a satisfactory setting of polyamide fiber materials on a production basis, utilizing the aforescribed method. In one device suggested for this purpose the fabric is passed between two heated surfaces, such as two heated rollers, between which the fabric is placed under a predetermined uniform pressure over its entire width. Another device proposes the movement of the fabric along a stationary heated surface by means of a belt. In still another device the fabric web is carried over a roll, being pressed onto the same by a heated substantially stationary sleeve or shoe.

The hitherto proposed method and devices for the setting of polyamide fabrics are relatively cumbersome and inefficient in commercial oper-

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ation, do not yield desirably uniform results, and require a relatively high amount of skill on the part of the operator. They do not readily lend themselves to the desired accurate maintenance and control of the relatively critical operating conditions required for a satisfactory setting of polyamide fibers and are encumbered by a relatively low operational output usually not materially exceeding 4–5 yards per minute.

One object of the instant invention comprises, inter alia, a device for the efficient, high speed, heat-setting of textile materials and particularly the heat-setting of textile materials containing or consisting of polyamides.

Another object of the invention comprises an efficient high speed device for the heat-setting of textile material and particularly the heat-setting of textile materials containing or consisting of polyamide fibers.

The foregoing and further objects of the invention will appear from the following description read in conjunction with the drawings in which:

Fig. 1 is a cross-sectional front view, partly broken away, of a construction in accordance with the invention as shown in Fig. 2 and in the plane I—I thereof;

Fig. 2 is a cross-sectional side view of the construction shown in Fig. 1 in the plane II—II thereof, showing additionally the front portion of the device as well as cooling, feed and take-up arrangement;

Fig. 3 is a side view of part of the construction shown in Figs. 1 and 2 with part of the side of the outer housing broken away;

Fig. 4 is a top view of part of the construction shown in Fig. 2 in the plane IV—IV thereof;

Figs. 5 and 6 are side and stop views respectively illustrating details of the driving arrangement for the rollers and scrolls forming part of the construction shown in the preceding figures; and

Fig. 7 is a top view showing details of part of the driving arrangement for the cooling and pick-up roll as illustrated in Fig. 2.

The procedure involved in the application of a device in accordance with the invention essentially comprises the passing of a web of heat-settable textile fabric, while in substantially an extended state, through a heating zone, substantially at a rate of travel of about 36–144 yards per minute linear speed, substantially continuously directing heating gas current, while at a predetermined temperature, and in the case of polyamide fabric preferably of about 400–450°

F., onto said web, while travelling through said heating zone, substantially uniformly over the width thereof and over a length of web to substantially expose each portion of the moving web to said heating gas current for from 1 to 10 seconds, and substantially immediately thereafter passing said web substantially continuously out of said heating zone and preferably subjecting the same to cooling.

Within the preferred procedure, as applied to a polyamide fabric web, the same is passed in substantially extended state into the heating zone onto an endlessly travelling web supporting carrier therein, which carrier substantially moves at a rate of travel of about 36-144 yards per minute linear speed, and the web supporting surface of which is maintained at a temperature of about 400-450° F. The heating gas current is then substantially continuously directed within the heating zone upon the surface of the fabric, substantially during the period while the same is essentially carrier supported. The preferred application of the heating gas current is substantially in a direction transverse to the surface of the moving fabric web. In the event a roll is selected as the carrier for the fabric web within the heating zone, the direction of the heating gas current is essentially in a plane or planes substantially radial to the circumference of the roll.

The term "heat-settable" fabric or similar expression used herein is intended to designate any textile material containing or consisting of fibers capable of being set, (i. e. fixed) by the application of heat, into desired condition of modified characteristics.

Wherever in the specification and claims reference is made to polyamide fabrics or fibers or where such similar expression is used, the same is intended to connote any fabric or fiber consisting of or containing polyamide fibers and specifically polyamide fibers of synthetic linear polyamides.

As illustrated in the drawings, two rolls, 1 and 2 respectively, are mounted within an outer housing 3. A branched housing 4 is mounted within the outer housing 3 and extends into curved branches defining the ducts 5 and 5a. The inner surfaces 6 and 6a of ducts 5 and 5a define a heating space above the corresponding surface portions of the rolls 1 and 2. The inner surfaces 6 and 6a of the ducts 5 and 5a carry the nozzles 7 and 7a extending longitudinally of the surfaces of their respective rolls. The ends of the ducts 5 and 5a are curved downwardly ending in nozzles 8 and 8a. Baffles 9, 9a and 10 and 10a respectively are arranged within inner housing 4 to properly direct heating gas to the various nozzles in the branched ducts. Ducts 5 and 5a each carry branched portions 11 and 11a respectively continuing as ducts 12 and 12a which end in the flared openings 13 and 13a. The axles 14 and 14a of rolls 1 and 2 pass respectively through the flared ends 13 and 13a and the adjacent portions of ducts 12 and 12a. In this manner the flared ends 13 and 13a open into the center of the rolls 1 and 2.

A fan 15 mounted on shaft 16 and driven by the chain drive 17 from, for instance a motor (not shown), is mounted inside the neck 18 of the housing 4. Hinged baffles 19 and 19a inside housing 4 permit adjustment of air flow through the branched portions created by the baffles 9 and 9a respectively.

The front portion 20 of housing 3 carries the trough section 21 having the slotted aperture 22

supported by the rounded angle portions 23. Pairs of opposing burners 24 and 24a respectively are provided in the rear portion of the outer housing 3, being supported by U brackets 80, 80a bolted to angle bracket 81, 81a. These are the conventional gas burners of the Venturi type comprising injector extensions 82, 82a, flared, perforated inner tubes 83, 83a and outer tubes 84, 84a carrying air inlets 85, 85a. Each pair of burners on the same side is supplied with fuel gas by way of suitable connections such as pipe 25 and branched pipe 26 (Fig. 3).

A frame structure 28 is secured to the front portion 20 of housing 3 and includes cross-supports 29, 30 and 30a and floor supports 31 and 31a. The frame structure supports cooling roll 32, shaft 33 for fabric feed roll 34, shaft 35 for fabric pickup roll 36 and guide rolls 69, 70 and 72. Auxiliary frame 30b at one side of the frame structure carries the gears 38, 39 and sprockets 37, 40 and 40a on shafts 37a and 39a (Fig. 7). As illustrated in Figs. 2 and 7, shaft 35 is driven through chain 63 by sprocket 37 on shaft 37a, which in turn is driven by the gear 38 meshing with gear 39 on shaft 39a driven by sprocket 40, chain 41, and sprocket 42 secured to the shaft 14 of roll 1. A second sprocket 40a on shaft 39a behind gear 39 drives through chain 43 and sprocket 44 the cooling roll 32.

As may be seen from Figs. 2 and 3, the outer housing 3 carries the closed side walls 45, rear wall 46, front wall 20, top wall 47 and bottom wall 48. Thus the entire housing 3 is completely enclosed on all sides with the exception of the slot 22 for the passing of a fabric web into the housing and the removal of the fabric therefrom. The top 47 of the outer housing 3 carries the fan exhaust 27.

The inner branched housing 4 carries the sides 49 thereby defining a completely closed duct system for a heating gas entering through the open neck 18 and forced out through the nozzle openings 7, 7a, 8 and 8a.

The construction of the heating rolls is illustrated, for instance, in Fig. 1. As there shown, the heating rolls, such as heating roll 1, carry in their center the substantially stationary wall or baffle 50 dividing the roll into two substantially equal halves. In each half a number of cones 51a, 51b and 51c are mounted onto the central axle by way of the flanged supports 52. Each cone carries a central opening 53 and the openings of successive cones are progressively smaller with the largest cone-opening at the outer end of the roll and the smallest cone opening near the center of the roll. The cones are mounted in spaced relationship to the inner wall of the roll. Strengthening cross-braces 54 are provided within the rolls at the outer portions thereof. The roller shafts are mounted in the bearings 55 and 55a respectively. A series of scroll or expansion rollers 56, 57 and 58 (with conventional expansion grooving) are mounted within housing 3 and serve the proper guiding, extending and/or positioning of the traveling fabric web. The expansion rollers are preferably geared for a circumferential linear speed approximately 5-20% in excess of the circumferential linear speeds of the rolls 1 and 2. Gear wheel 59 (Fig. 1) is keyed to roll shaft 14a and is driven by the meshing gear 60, driven by suitable motor 61. Gear 59 meshes with gear 62 bearing supported and rotatable on shaft 58 (Fig. 5). Gear 62 engages gear 64 keyed to roll shaft 14. Sprockets 65 and 66 (Figs. 5 and 6) are keyed to shafts 56 and 57 respectively;

sprocket 67 is secured to gear 62, freely rotatable with the same on shaft 58. Chain 68 establishes the driving connection between sprockets 65, 66, and 67 for rotation of their respective scroll rollers. Sprocket 87, keyed to lower scroll shaft 57, drives scroll shaft 58 by way of chain 68a and sprocket 88 keyed on scroll shaft 58.

In the practical application of the invention a web of textile material as, for instance, on feed roller 34 (Fig. 2), is fed by way of the guide rollers 69 and 70 and scroll 56 through the slot 22 and onto roll 1 passing underneath lower surface 6 of duct 5. The fabric web indicated by the numeral 71 passes from upper roll 1 over scroll 58 and lower roll 2, passing the latter beneath the nozzle surface 6a of duct 5a. The web passes from roll 2 around scroll 57 out through the slot 22 onto cooling roll 32 by way of the guide rolls 72 and 73. The cooling roll is of the conventional hollow type provided with a circulating cooling water system (not shown). The fabric passes from the cooling roll over guide 74 onto the pickup roll 36 on shaft 35. Angle portions 23 extend over at least the width of the fabric web. They are vertically adjustable and are set with their smooth rounded portions to substantially tangentially engage the feeding and discharging web portions respectively. A guide roller 23a acts as a separator for the feeding and discharging web portions and is mounted to essentially form, with the angle portions 23, a seal against the passage of excessive amounts of cold air into the heating zone through slot 22. Fig. 2 illustrates the operation after a new roll of textile material has just been started. In that case roll 34 is fairly full with the pickup roll 36 relatively small. The situation as it occurs near the end of the original feed roll 34 is illustrated in dotted outline. In that case the feed roll will be relatively small and the pickup roll will be relatively large.

The burners 24 and 24a heat the air or other heating gas within the housing 3 and the fan 15 forces the air into the duct system of the inner housing. A portion of the air passes straight through and out of the centrally located nozzles 7 and 7a near the scroll 58. Other portions of the air are deflected by the various baffles 9, 9a, 10, 10a, being forced out through the various nozzles 7, 7a in the duct surfaces 6 and 6a of the ducts 5 and 5a. Still another portion of the air, forced into and through the duct system, is branched off into the ducts 11 and 11a respectively, passing thence through conduits 12 and 12a respectively and out of the flared duct openings 13 and 13a. The air issuing from the duct openings 13 and 13a will in part go through the cone openings, ultimately reaching and being deflected from the inner plate 50 to and outwardly along the inner periphery of the roll. By reason of the inwardly decreasing size of the cone openings, a portion of the air is deflected by each cone along the baffled cone surface and against the inner periphery of the roll. The air flows outwardly along the inner periphery of the roll into the outer space 75 within housing 3, being thence drawn back into the fan 15. The nozzles 7 and 7a are so shaped and dimensioned that they supply a relatively uniform forced heating gas current over substantially the entire width of the fabric and the nozzles are preferably radially positioned with respect to the circumference of the rolls defining essentially radial slots extending substantially across the width of the fabric web and substantially parallel to the axis of rotation of the respective rolls. The temperature of the

air or other heating gas in thermostatically controlled to maintain a predetermined temperature or temperature range, the thermostatic element being diagrammatically illustrated as 76 (Fig. 2).

The air or other heating gas forced out of the nozzles and directed against the travelling fabric web is forced out of the open sides 77 and 77a and the open ends 78 and 78a (Figs. 1 and 3) into the space 75 within housing 3, being thence also passed back into the fan 15 for recirculation through the system. After a certain period of operation an undesirable concentration of combustion gases and/or moisture may obtain in the heating gas which is recirculated through the system. In that event the exhaust 27 is used to draw off any desired amount of heating gas and preferably up to not in excess of 30%. Suitable provision should be made for replenishing the amount of exhausted heating gas. If air is used as the heating medium the same may be replenished, within certain limits, by outside air leaking in at various places including the slot 22. It is, however, recommended to provide a separate air inlet for the replenishment of exhausted heating air, such as the hinged panel door 90 (Fig. 3). A conventional air heating element (not shown) is preferably positioned within the inlet for the purpose of preheating the admitted air. There will thus be a minimum of interference with the desired temperature or temperature range to be maintained within the system. In many cases it is desirable and of advantage to pre-set the exhaust to a given rate and coordinate therewith the admission of make-up air to thereby automatically prevent undesirable accumulation of moisture and/or combustion gases.

The motor, such as motor 61, used for driving the rolls is preferably a variable speed motor. Alternatively any other conventional variable speed drive arrangement may be used. The rate of travel of the fabric web through the housing or heating zone must be carefully predetermined for the given fabric and a given finish to be obtained and to that end should be coordinated with the particular temperature or temperature range at which the heating is conducted. Thus a given treatment may call for a heating of the fabric at a given temperature or within a given temperature range for a given period of time. The speed of rotation of the rolls should then be so adjusted that the fabric web travels over the rolls and in and out of the housing in a period of time assuring that no part of the web has remained within the heating zone longer than the predetermined period. For this reason the provision of suitable cooling means, such as a cooling surface and/or an applicator for fluid refrigerant, is important in that it immediately removes any heat from the fabric web that may have any continuing effect and would thus tend to spoil the results obtained within the heating zone.

Within the preferred embodiment of my invention the web is fed through the heating zone, i. e., in the case of the device here illustrated, through the housing at a rate of speed of approximately 36 to 144 yards per minute. The temperature within the heating zone is maintained, dependent upon the particular type of material used, at a predetermined temperature or temperature range, i. e. specifically for polyamide material at about 400-450° F. and heating gas current is directed onto the fabric web as it travels through the heating zone, preferably at a velocity of an order of magnitude of at least 400 feet per minute. Satisfactory results are obtained when causing

the heating gas current to be directed onto the fabric web at a velocity of an order of magnitude from 400-4000 feet per minute.

Instead of using a multiple roll arrangement as illustrated, for instance, in the drawings, a single web carrier or roll may be provided. Thus, in the preferred embodiment of my novel device, an auxiliary guide roll 91 is provided, permitting the fabric web to be carried over a single roll. In such case the fabric would travel from scroll 56 over roll 1 and thence out of slot 22 over guide roll 91 direct to guide roll 73. This is illustrated in the drawings by the broken outline of the fabric as shown in Fig. 2.

In its broadest aspect the device in accordance with the invention essentially comprises means defining a heating zone, means defining a predetermined path of travel for a heat settable textile material through said heating zone, means for continuously passing such material through said heating zone along said path of travel in from one to ten seconds, means for substantially continuously propelling heating gas current of a velocity of at least 400 feet per minute into said heating zone along at least the major portion of said path of travel to impinge substantially uniformly upon the material from at least one side thereof as it is passed through said zone, and means for substantially maintaining the temperature of the impinging heating gas current and the temperature within said heating zone, on substantially all sides of said material, at a predetermined heat setting temperature for said material.

Within the broad concept of the preferred embodiment of the invention, the device essentially comprises at least one endlessly movable carrier, preferably a rotatable roller, defining a web carrying surface, means for substantially defining a heating zone for said surface over at least a portion thereof, means for passing a web of heat settable textile material into said zone onto and along a portion of said surface in web carrying engagement therewith, and at a rate of speed for 1-10 seconds web exposure to said heating zone, means for temperature controllably heating at least the web engaging portion of said surface to a predetermined heat setting temperature for such material of at least 300° F., high velocity heating gas nozzle means positioned and shaped to direct high velocity heating gas to within said space onto and over at least part of such web engaging portion to substantially the web carrying width thereof, means for substantially continuously propelling heating gas current of a nozzle velocity in excess of 400 feet per minute through said nozzle means, means for substantially maintaining the temperature of the high velocity heating gas current in said heating zone at a predetermined heat setting temperature for such material of at least 300° F., and means for passing such web off said surface and out of said space.

Further within the broad concept of the preferred embodiment of the invention the means for heating the web engaging surface portion preferably comprise a heating space within the web carrier in heat exchange relation to at least the web engaging surface portion and the length of the heating zone is preferably dimensioned, in cooperation with the web passing means, for web travel through the heating zone at a rate of linear speed of 36-144 yards per minute.

Though air is the preferred heating gas useful in the practice of my invention, it is possible and

sometimes advisable within the dictates of special conditions and circumstances to use another gas, and preferably an inert gas, as the heating medium. This is particularly recommended in those cases where particular tints or shades tend to heat-oxidation, in which case impairment of the shades can be avoided by the use of a non-oxidizing heating medium.

Though the device in accordance with the invention has been specifically exemplified in connection with the heat-setting of polyamide materials, the same has proven useful for the heat-setting of other textile materials and particularly those for which heat-treatment is conventionally resorted to for the procurement of a particular result or finish. Experience has proven that in many of these cases the device in accordance with the invention has rendered such finishing treatments more efficient and economical and less subject to operator's control than was hitherto possible with conventional methods or devices, and in many of these cases the use of the device in accordance with the invention for these special heat-treating purposes, has made it possible for the first time to subject the goods to the particular heat-treatment at high operational speeds.

A specific example of the usefulness of the novel device for the heat-setting of goods other than the heat-setting of polyamides is, for instance, the heat-treatment of acetates. In this case a fabric web consisting of or containing acetate fibers is fed into, for instance, the device illustrated herein at speeds between 36-144 yards per minute and a total exposure time of 1-10 seconds, with the temperature within the heating zone between 300° F.-360° F. A very desirable chintz-like glazing effect is obtained in this manner. For the purpose therefore of assuring the greatest flexibility and range of usefulness of my novel device, I prefer to have the heat control thereof cover a range of from 300° F. or lower to about 500° F. or higher.

The foregoing description is for purposes of illustration and not of limitation, and it is, therefore, my intention that the invention be limited only by the appended claims or their equivalent wherein I have endeavored to claim broadly all inherent novelty.

I claim:

1. Device for the heat setting of textile materials which comprises means defining a heating zone, means defining a predetermined path of travel for a heat settable textile material through said heating zone, means for continuously passing such material through said heating zone along said path of travel in from 1-10 seconds, means for substantially continuously propelling heating gas current of a velocity of at least 400 feet per minute into said heating zone along at least the major portion of said path of travel to impinge substantially uniformly upon the material from at least one side thereof as it is passed through said zone, and means for substantially maintaining the temperature of the impinging heating gas current and the temperature within said heating zone, on substantially all sides of said material, at a predetermined heat setting temperature for said material.

2. Device in accordance with claim 1 in which said last mentioned means are arranged to substantially maintain a predetermined heat setting temperature of at least 300° F.

3. Device in accordance with claim 2 in which there is additionally provided means for cooling said material upon leaving said heating zone.

4. Device in accordance with claim 2 in which said temperature maintaining means are arranged to substantially maintain a predetermined heat setting temperature between 300-500° F.

5. Device in accordance with claim 4 in which the length of said heating zone is dimensioned in cooperation with said passing means for material travel through said heating zone at a rate of linear speed of about 36-144 yards per minute.

6. Device for the heat setting of textile materials which comprises means defining a heating zone, means defining a predetermined path of travel of a heat settable web of textile material through said heating zone and including endlessly movable web carrier means, means for driving said web carrier means at a rate of speed to expose each portion of such web to said heating zone for from 1-10 seconds, means for substantially continuously propelling heating gas current of a velocity of at least 400 feet per minute into said heating zone along at least a major portion of said path of travel to impinge substantially uniformly upon at least one side of the moving web, means for substantially maintaining the temperature of the impinging heating gas current and the temperature within said heating zone, on substantially all sides of the said web, at a predetermined heat setting temperature for said material of at least 300° F., and means at the exit end of said heating zone for continuously and rapidly cooling such web to below its heat setting temperature.

7. Device in accordance with claim 6 in which said temperature maintaining means are arranged to substantially maintain a heat setting temperature of between 300-500° F., and in which the length of said heating zone is dimensioned in cooperation with said driving means for web travel through said heating zone at a rate of linear speed of 36-144 yards per minute.

8. Device for the heat setting of textile materials which comprises at least one endlessly movable carrier defining a web carrying surface, means substantially defining a heating zone for said surface or at least a portion thereof, means for passing a web of heat settable textile material into said zone onto and along a portion of said surface in web carrying engagement therewith, and at a rate of speed for 1-10 seconds web exposure to said heating zone, means for temperature controllably heating at least the web engaging portion of said surface to a predetermined heat setting temperature for such material of at least 300° F., high velocity heating gas nozzle means positioned and shaped to direct high velocity heating gas to within said space onto and over at least part of such web engaging portion to substantially the web carrying width thereof, means for substantially continuously propelling heating gas current of a nozzle velocity in excess of 400 feet per minute through said nozzle means, means for substantially maintaining the temperature of the high velocity heating gas current in said heating zone at a predetermined heat setting temperature for such material of at least 300° F., and means for passing such web off said surface and out of said space.

9. Device in accordance with claim 8 in which said means for heating said web engaging surface portion comprises a heating space within said carrier in heat exchange relation to at least said web engaging surface portion, and in which the length of said heating zone is dimensioned in cooperation with said web passing means for

web travel through said heating zone at a rate of linear speed of 36-144 yards per minute.

10. Device for the heat setting of textile materials which comprises at least one substantially hollow, substantially open ended, rotatable roller of substantially heat conductive material and defining a web carrying surface, a housing substantially enclosing said roller substantially in spaced relation to the roller ends, means for passing a web of heat-settable textile material into said housing onto and over said roller, in web carrying engagement with a portion of said surface, means for temperature controllably supplying heating gas to the interior of said roller in heat exchange flow with the inner peripheral surface of said roller, a multiple number of high velocity heating-gas nozzles within said housing arranged substantially equally distant from and over at least part of such web engaging portion to direct high velocity heating gas onto and over substantially said web engaging portion to substantially the web carrying width thereof, means for substantially continuously propelling heating gas current of a nozzle velocity in excess of 400 feet per minute through said nozzles, means for substantially maintaining the temperature of the heating gas supplied to said roller interior and the temperature of the high velocity heating gas current issuing from said nozzles at a predetermined heat setting temperature for such material of at least 300° F., means for passing such web off said surface and out of said housing, and substantially coordinated means for rotating said roller and passing said web out of said housing at a predetermined rate of speed for web travel through said housing in from 1-10 seconds, the length of web travel through said housing being dimensioned in cooperation with said coordinating means for web travel through said housing at a rate of linear speed of 36-144 yards per minute.

11. Device in accordance with claim 10 in which additionally means are provided for cooling such web upon passing out of said housing.

12. Device in accordance with claim 11 in which each of said nozzles extends substantially parallel to the roller axis for substantially the web carrying width of said roller, in which the interior of said roller is provided with baffle means arranged and dimensioned to deflect air substantially uniformly to substantially all parts of said inner peripheral surface and out of the roller ends, in which said means for supplying heating gas to said roller interior are positioned to discharge heating gas onto said baffle means, in which heating gas is supplied to said nozzles and to said roller interior by gas ducts substantially branching from a substantially common duct, in which there are additionally provided means for recycling into said common duct heating gas discharged into the housing from the interior of said roller and from the web engaging portion of said roller, and in which said temperature maintaining means are substantially located in said common duct.

13. Device for the heat setting of textile materials which comprises a first and second rotatable roller, each substantially hollow and open ended, and of substantially heat conductive material, and defining a web carrying surface, both of said rollers being positioned with their axes substantially parallel and with their web carrying surfaces in substantial alignment, means for passing a web of heat-settable textile material into said housing onto the first of said rollers and over both of said rollers, as to each of said

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roller in web carrying engagement with a portion of its surface, means for temperature controllably supplying heating gas to the interior of each roller in heat exchange flow with the inner peripheral surface of each roller, a first and second set of a multiple number of high velocity heating-gas nozzles within said housing, one set for each of said rollers and the nozzles of each set arranged substantially equally distant from and over at least part of the web engaging portion of its roller surface to direct high velocity heating gas onto and over the same to substantially the web carrying width of its roller, means for substantially continuously propelling heating gas current of a nozzle velocity in excess of 400 feet per minute through said nozzles, means for substantially maintaining the temperature of the heating gas supplied to said roller interior and the temperature of the high velocity heating gas current issuing from said nozzles at a predetermined heat setting temperature for such material of from 300-500° F., means for passing such web off the web carrying surface of said second roller and out of said housing, and substantially coordinated means for rotating at least one of said rollers, and passing said web out of said housing at a predetermined rate of speed for web travel through said housing in from 1-10 seconds, the length of web travel through said housing being dimensioned in cooperation with said coordinating means for web travel through said housing at a rate of linear speed of 36-144 yards per minute.

14. Device in accordance with claim 13 in which additionally means are provided for cooling such web upon passing out of said housing.

15. Device in accordance with claim 14 in which each of said nozzles of each set extends substantially parallel its roller axis for substantially the web carrying width of its roller, in which the interior of each roller is provided with baffle means arranged and dimensioned to deflect air substantially uniformly to substantially all parts of the inner peripheral surface of the roller and out of the roller ends, in which said

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means for supplying heating gas to the interior of each roller are positioned as to each roller to discharge heating gas onto the baffle means within the roller, in which heating gas is supplied to said sets of nozzles and to the interior of each roller by gas ducts substantially branching from a common duct, and in which there are additionally provided means for recycling into said common duct heating gas discharged into the housing from the interior of each roller and from the web engaging portion of each roller and in which said temperature maintaining means are substantially located in said common duct.

16. Device in accordance with claim 15 in which said heating gas propelling means propel through said nozzles heating gas current of a nozzle velocity of from 400-4000 feet per minute.

17. Device in accordance with claim 16 in which said temperature maintaining means are arranged to substantially maintain a heat setting temperature of about from 400-450° F.

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