

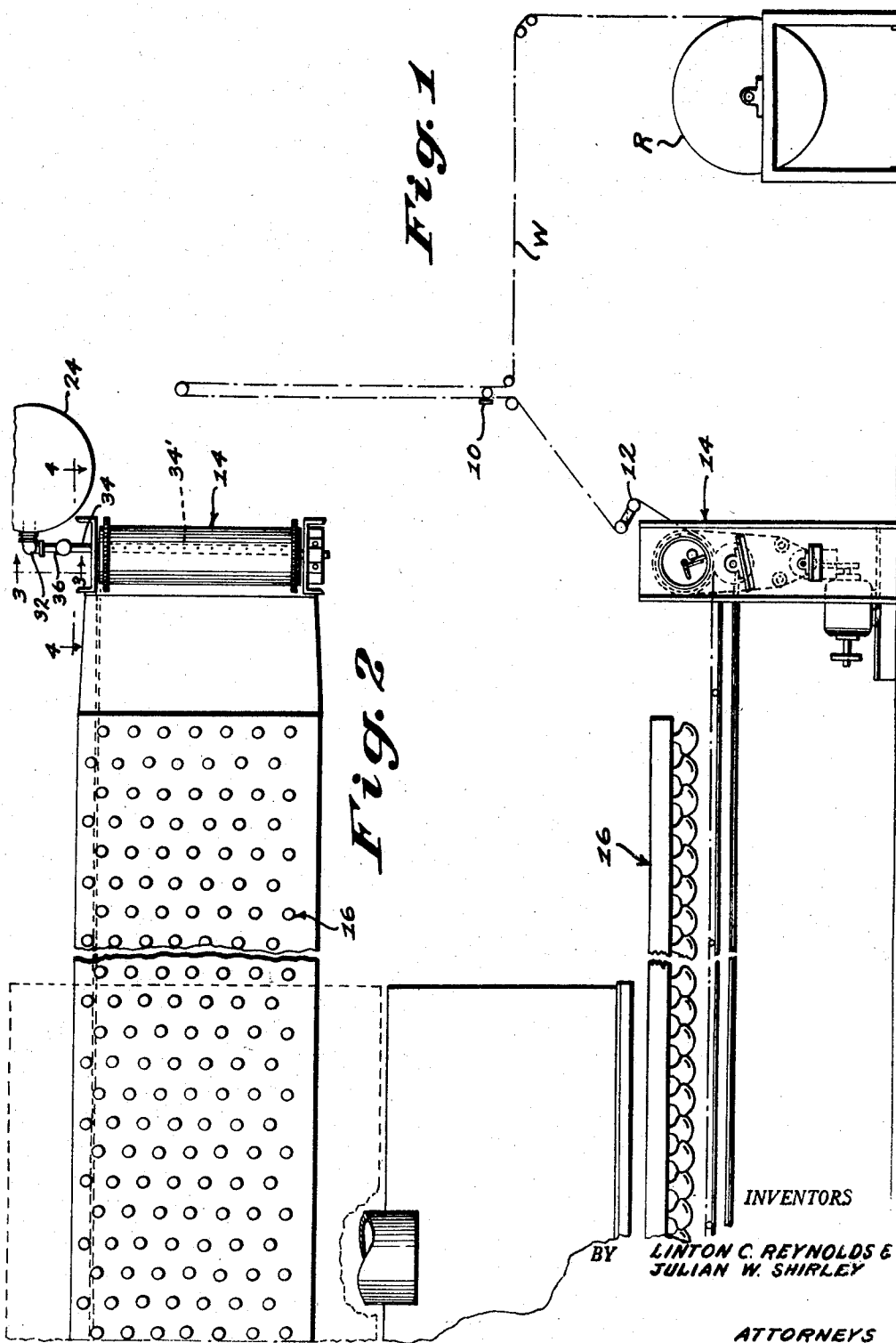
July 7, 1959

L. C. REYNOLDS ET AL
MEANS FOR PRODUCING A TEXTILE FABRIC
HAVING EXCEPTIONAL WEAR RESISTANCE

2,893,315

Filed Sept. 12, 1958

6 Sheets-Sheet 1



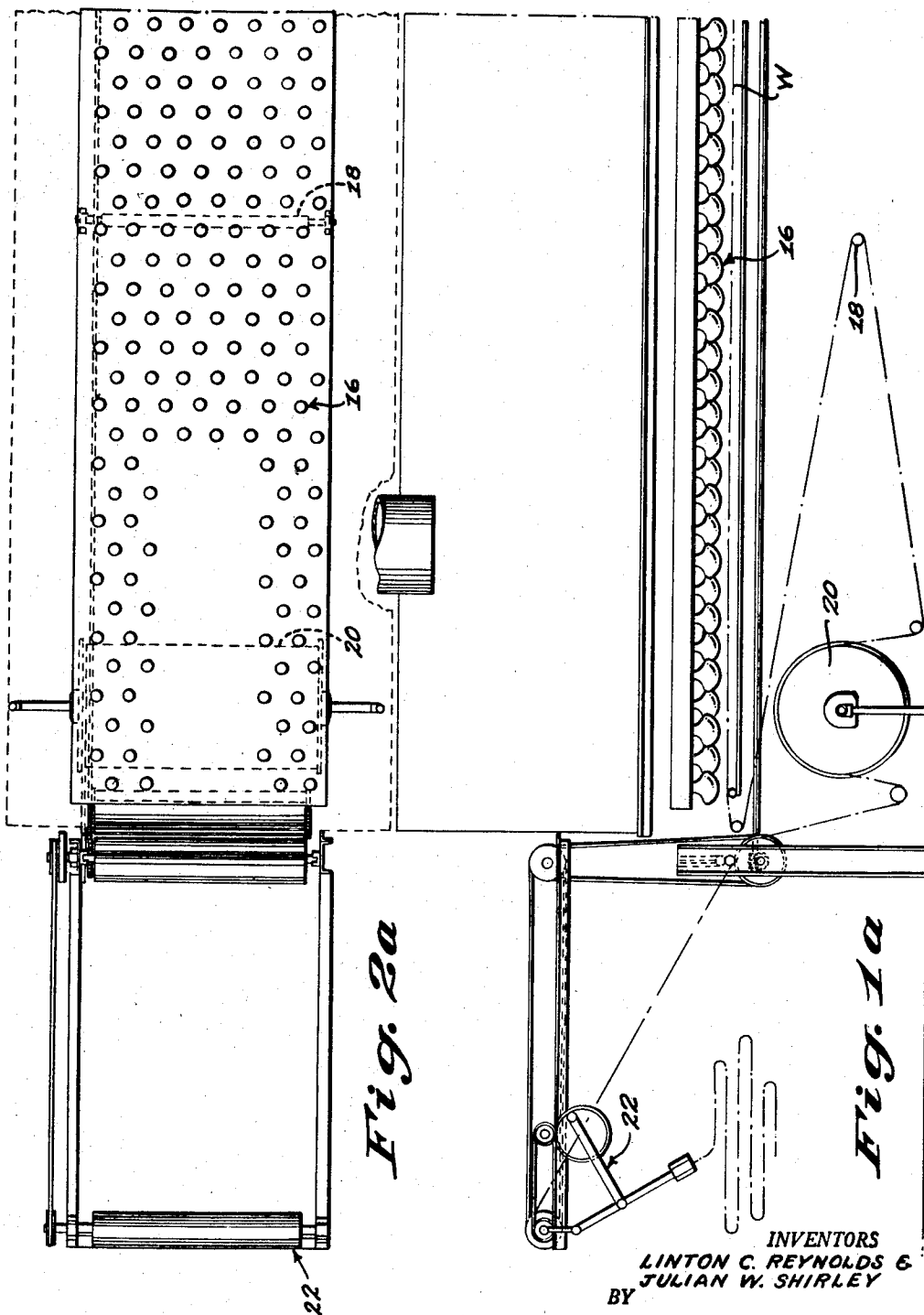
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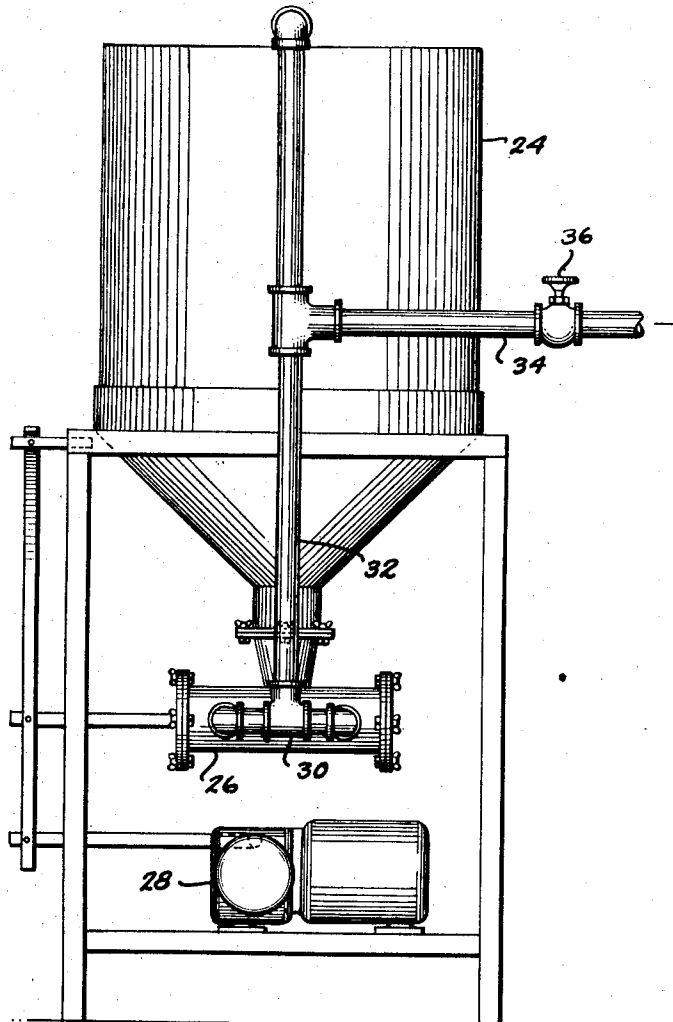
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Fig. 3



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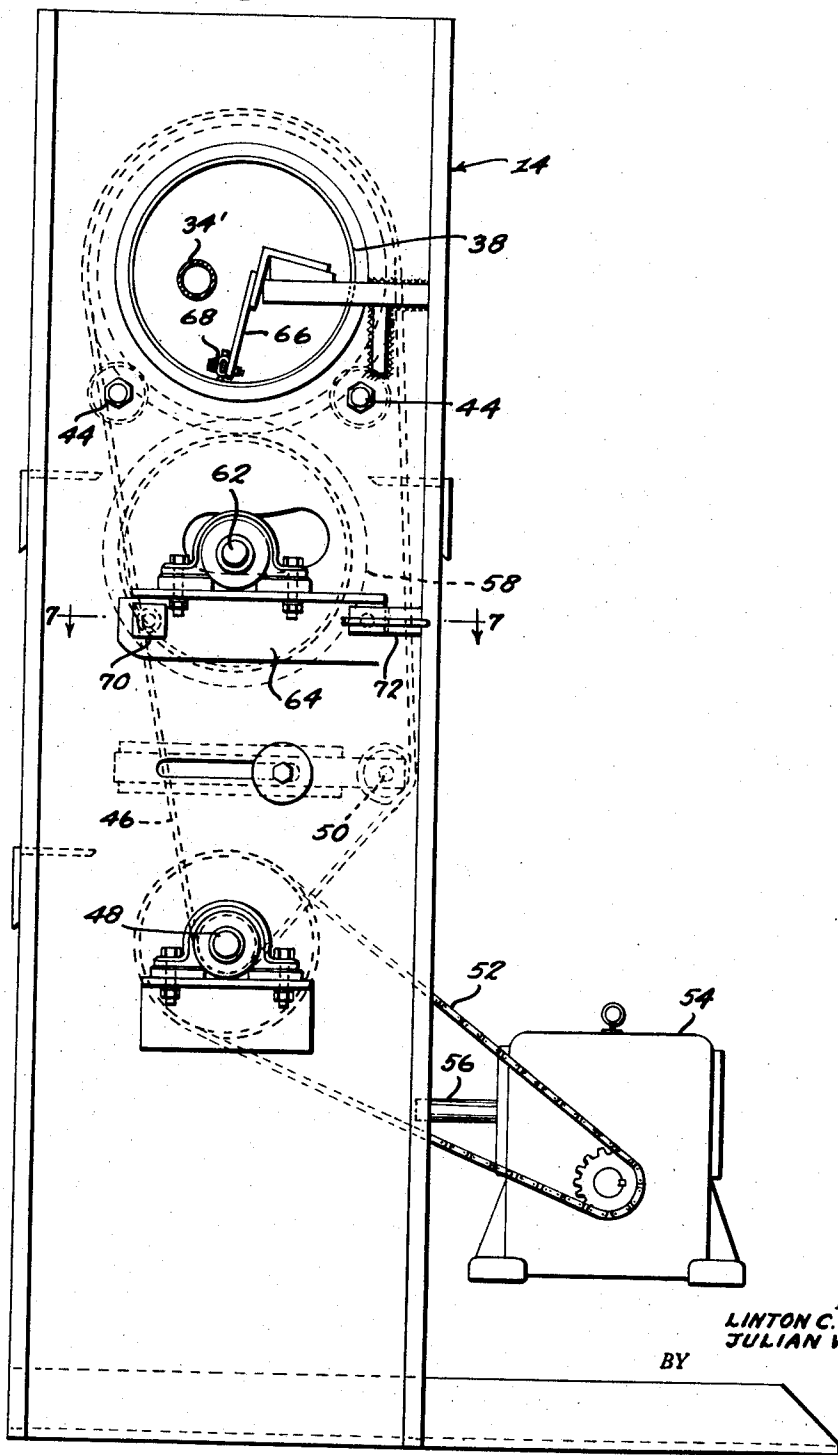
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Fig. 4



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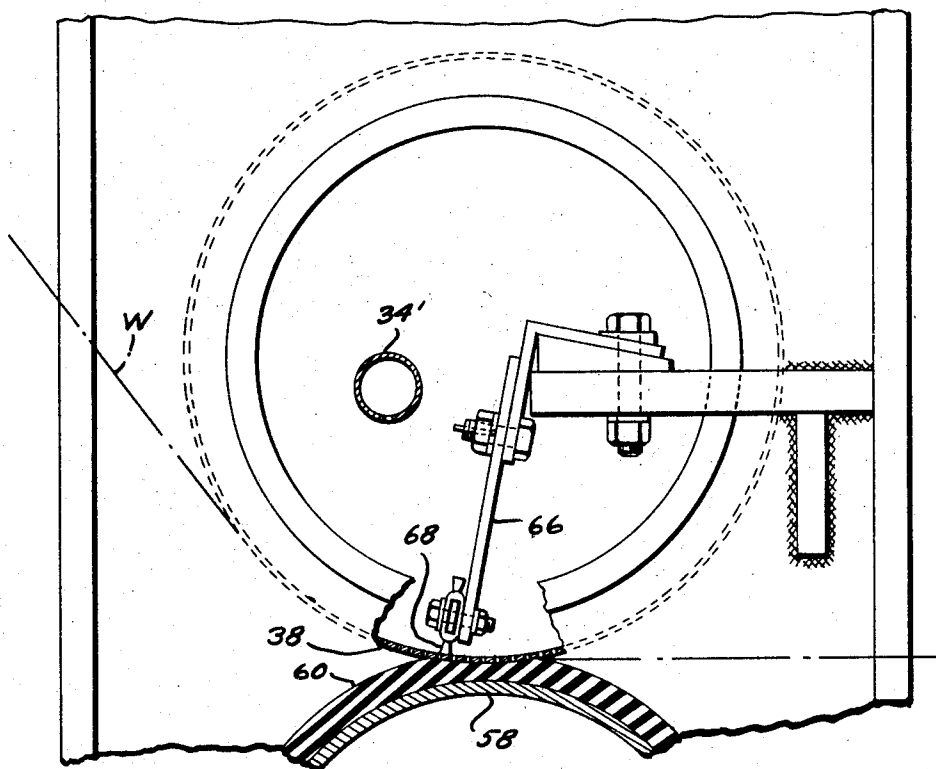


Fig. 6

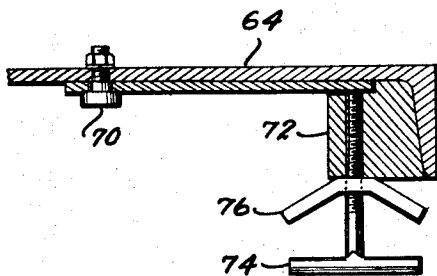


Fig. 7

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MEANS FOR PRODUCING A TEXTILE FABRIC HAVING EXCEPTIONAL WEAR RESISTANCE

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Original application September 19, 1957, Serial No. 684,916. Divided and this application September 12, 1958, Serial No. 760,682

2 Claims. (Cl. 101-119)

This invention relates generally to the production of special purpose textile fabrics, and more particularly to means for producing textile fabrics having exceptional wear resistance and selectively incorporating other desirable surface characteristics, such as surface traction or non-slip properties, or knobby surface configurations that may exhibit relatively low or high friction coefficients and that may be varied readily as to the degree of roughness or smoothness desired, and all of which may be further arranged by shape and coloring and the like for desired ornamental effects, while maintaining the fabric flexible and porous.

Briefly described, the means of the present invention is characterized by a manner of handling, and by an arrangement of apparatus to effect handling of, a textile fabric in web form while conditioning a surface thereof with special properties such as are indicated above, the conditioning being accomplished by applying to the web surface a thermoplastic composition of relatively high viscosity and having thixotropic properties suiting it for surface application, and the application of this composition being effected by doctoring it into the apertures of a screen roll and presenting the fabric web at an arcuate surface portion of this roll to pick up effectively from the screen apertures the plastic composition doctoring therein.

The relatively high viscosity necessary to suit the above noted thixotropic plastic composition for surface application on a fabric web is of an order such as to prevent this composition from flowing readily through the apertures of a screen roll, but by doctoring the composition into the screen apertures its thixotropic property is utilized to render it fluid as a result of the mechanical shear action of the doctoring means, so that the composition is thus made to flow advantageously onto the fabric web from the screen apertures under conditions that allow it to coagulate or set up again at the web surface so as not to flush into the fabric but remain at the surface thereof with a substantially raised knobby configuration, as disclosed in further detail and claimed in copending application Serial No. 698,056, filed November 22, 1957.

For application to the fabric web in the above noted manner the plastic composition is supplied according to the present invention interiorly of the screen roll at the back of doctoring means arranged therein, so that the plastic composition supply is dammed thereat and doctoring into the screen apertures as the screen roll is rotated. In order to provide for picking up the doctoring plastic composition from the screen apertures, and at the same time to prevent fouling of the exterior screen surface, the web is presented to the screen roll so as to seal the apertures thereof exteriorly over an arcuate surface area extending in advance of the point of doctoring in excess of the interior screen surface extent of the plastic composition supply therein and beyond the point of doctoring sufficiently to allow an effective pick-up by the web from the screen apertures.

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The web is presented to the screen roll in this manner by training it past the screen roll so as to wrap thereon under tension in advance of the point of doctoring and by further pressing it against the screen roll over an area extending in both directions from the point of doctoring. The pressing of the web against the screen roll is accomplished advantageously by means of a pressure roll having a highly compressible, resilient covering thereon and arranged in opposed relation to the screen roll substantially at the point of doctoring under a pressure sufficient to deform the pressure roll covering into surface contact therewith over the desired area in both directions from the point of doctoring. By this arrangement an accentuated or extended nip of substantial breadth is formed between the screen and pressure rolls that not only effects a clean pickup of the doctoring plastic composition from the screen apertures by the web, but that also grips the web effectively against slippage and thereby eliminates any difficulty with smearing of the plastic composition on the web or on the exterior screen roll surface for subsequent tracking on the web.

The screen roll employed for applying the plastic composition to the web is of hollow cylindrical form, and may be suitably constructed of sheet metal rolled to a cylindrical shape and welded, with the screen apertures then being punched or drilled therein according to the particular size and pattern desired. The thickness of the sheet metal used to form the screen roll in this manner will determine the thickness or height of the plastic composition application picked up by the web from each screen aperture and the sheet metal thickness is accordingly selected in accordance with the thickness or height of plastic composition desired on the web.

As to the thermoplastic composition that is used in treating or conditioning a textile fabric according to the present invention, it is characterized, as previously noted, by thixotropic properties and a relatively high viscosity in the form in which it is supplied to the screen roll. With compositions of the foregoing nature, a work glove fabric, for example, can be produced in accordance with the present invention having spaced knobs or dots of the composition applied thereto and hardened to provide unusual wear resistance at the exposed surfaces of a glove structure formed therefrom, without substantially affecting either the flexibility or porosity of the fabric. An advantageous variation for certain purposes may be provided by applying the spaced knobs in the usual manner and then flattening them before they are hardened completely so as to obtain a smoother configuration on the fabric surface for such uses as in laundry bags that need good wear resistance but that must be manually handled so that too rough or too knobby a surface would be objectionable. The plastic composition employed may also be modified to harden with non-slip properties so as to produce a conditioned fabric uniquely suited for such uses as at the soles of children's sleeping garments that include foot portions.

These and many other special purpose fabrics can be produced readily according to the present invention as described in further detail below in connection with the accompanying drawings, in which:

Fig. 1 is a partial side elevation, largely diagrammatic, of the entrance end of apparatus arranged for producing special purpose textile fabrics in accordance with the present invention;

Fig. 1a is a complementary side elevation showing the discharge end of the apparatus illustrated in Fig. 1;

Fig. 2 is a plan view corresponding generally to Fig. 1;

Fig. 2a is a plan view corresponding generally to Fig. 1a;

Fig. 3 is a detail showing the arrangement provided for supplying the plastic composition to the applicator means

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of the apparatus substantially as seen in elevation from the position indicated by the line 3—3 in Fig. 2;

Fig. 4 is an enlarged detail in end elevation of the applicator means employed in the apparatus substantially as seen from the position indicated by the line 4—4 in Fig. 2;

Fig. 5 is a fragmentary right side elevation detail corresponding generally to Fig. 4;

Fig. 6 is a further enlarged detail illustrating the arrangement of the screen roll of the applicator means, substantially at the line 6—6 in Fig. 5, for receiving and handling the plastic composition supplied interiorly thereto; and

Fig. 7 is a sectional detail taken substantially at the line 7—7 in Fig. 4 to illustrate further the mounting arrangement of the pressure roll provided at the screen roll.

Referring now in detail to the drawings, and more particularly at first to Figs. 1 and 2, the illustrated apparatus is arranged for training a fabric web W from a supply roll R to a vertically extending run and return at which its transverse position may be conveniently regulated by conventional air guides or the like as indicated at 10, and then past adjustable tensioning bars 12 to an applicator means designated generally by the reference numeral 14 at which the web W has the plastic composition applied thereto in the manner described generally above. Beyond the applicator means 14 the web continues through heating means indicated generally by the reference numeral 16 at which hardening heat is provided to cure the plastic composition just applied to the web W. Figs. 1a and 2a show the course of the web W upon leaving the heating means 16 as extending backwardly to a guide roll 18 in a reach sufficient to allow partial cooling thereof before being guided over a cooling drum 20 and then drawn through a plaiting means 22 at the delivery end of the machine.

Fig. 3 illustrate in further detail the arrangement provided for supplying the plastic composition to the applicator means 14, this arrangement comprising a mix tank 24 having a funnel shaped bottom leading to a double acting pump unit 26 that is driven from a gear motor 28 as illustrated. The discharge from the double acting pump unit 26 is connected through a T fitting from which a conduit 32 runs to the top of the mix tank 24, with a branching supply line 34 intermediate the length of conduit 32 and extending therefrom to the applicator means 14 at a perforated length 34' for supplying the plastic composition thereto, the branch line 34 being fitted with a throttle valve 36 by which the flow of plastic composition to the perforated length 34' may be regulated.

The applicator means 14 is illustrated more particularly in Figs. 4 and 5 of the drawings in which it is shown to comprise a screen roll 38 fitted with end hoops 40 that carry sprocket members 42 arranged to seat and ride on support rolls 44. The sprocket members 42 carried by the end hoops 40 are engaged by sprocket chains 46 extending from a countershaft 48 and maintained tight by an adjustable idler sprocket at 50. The countershaft 48 is arranged to be driven through a further sprocket chain connection 52 from a speed reducer unit 54 having an input shaft at 56 that may be driven from any suitable source of power (not shown) for rotating the screen roll 38 on the support rolls 44. Opposing the screen roll 38 from below is a pressure roll 58 fitted with a highly compressible resilient covering, such as sponge rubber, as indicated at 60. This pressure roll 58 is carried by bearing units 62 that are supported for adjustment on pivoted bracket members 64 arranged and employed for the particular purpose explained further below.

Interiorly of the screen roll 38, as illustrated in Fig. 6, a doctoring means 66 is arranged with an extending flexible wiper edge 68 disposed in contact with the interior

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surface of the screen roll 38 throughout its length opposite the nip formed exteriorly with the pressure roll 58. The perforated length 34' of the branch line 34 running from the pump discharge conduit 32 is arranged within the screen roll 38 so as to supply the plastic composition thereto for damming at the doctoring means 66 so as to be doctored into the screen apertures as the roll 38 is rotated.

In order to present the web W at the screen roll 38 for picking up effectively from the apertures thereof the doctored plastic composition, the previously mentioned tensioning bars 12 are disposed in relation to the screen roll 38 so that the web W is caused to wrap on the surface of roll 38 and is maintained under tension thereat to seal the screen apertures exteriorly over an area extending in advance of the point of doctoring in excess of the interior screen surface extent of plastic composition contained therein (see Fig. 6). In addition, the pressure roll 58 is disposed at the screen roll 38 under a pressure sufficient to deform the sponge rubber covering 60 thereon into surface contact with roll 38 over an area extending in both directions from the point of doctoring, as illustrated in Fig. 6. The accentuated pressure roll nip thus formed insure adequate exterior sealing of the screen roll apertures immediately before and after the point of doctoring so that no fouling of the exterior surface of screen roll 38 can result while the web W picks up the doctored plastic composition from the screen apertures.

Fig. 7 shows in further detail the previously mentioned adjustable mounting arrangement for the pressure roll 58 as disposed to obtain the accentuated nip described above at the screen roll 38. For this purpose, the bracket members 64 carrying the pressure roll 58 are pivoted adjacent one end as indicated at 70 and have their other ends arranged at fixed block members 72 that carry clamping screws 74 fitted with lock nuts 76, by which arrangement the pressure roll 58 may be shifted to obtain a proper pressure at the screen roll 38 and then fixed in place thereat. The bracket members 64 may be further arranged with elongated slots (not shown) to provide for securing the pressure roll bearing units 62 thereon at a properly adjusted longitudinal position in relation to the adjustment of the bracket members 64 for the nip pressure desired as noted above.

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.

This application is a division of our copending application Serial No. 684,916, filed September 19, 1957.

We claim:

1. Apparatus for producing a textile fabric having exceptional wear resistance and selectively incorporating other desirable surface characteristics, said apparatus comprising a cylindrical applicator screen, means for rotating said screen about the cylindrical axis thereof, means for training said fabric in web form past said screen in the direction in which the adjacent screen surface moves upon rotation of said screen, means for supplying interiorly of said screen for surface application to said web a thixotropic plastic composition suited for rendering said fabric wear resistant and having a relatively high viscosity by which said plastic composition is prevented from flowing readily through the apertures of said screen, means for doctoring said plastic composition into the apertures of said screen, and means for pressing said web against said screen over an arcuate surface area thereof extending in both directions from the point of doctoring, said pressing means comprising a pressure roll having a highly compressible, resilient covering thereon and disposed in opposing relation to said screen substantially at the point of doctoring under a pressure sufficient to deform said covering into nip

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relation with said screen over said extended arcuate surface area.

2. Apparatus for producing a textile fabric having exceptional wear resistance and selectively incorporating other desirable surface characteristics, said apparatus comprising a cylindrical applicator screen, means for rotating said screen about the cylindrical axis thereof, means for training said fabric in web form past said screen in the direction in which the adjacent screen surface moves upon rotation of said screen, means for supplying interiorly of said screen for surface application to said web a thixotropic plastic composition suited for rendering said fabric wear resistant and having a relatively high viscosity by which said plastic composition is prevented from flowing readily through the apertures of said screen, means for doctoring said plastic composition into the apertures of said screen, said web training means being arranged in relation to said screen for wrapping said web under tension on said screen to seal the apertures thereof exteriorly over an area extending in advance of the point of doctoring in excess of the interior screen surface extent of plastic composition supplied

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therein, and means for pressing said web against said screen over an arcuate surface area thereof extending in both directions from the point of doctoring, said pressing means comprising a pressure roll having a highly compressible, resilient covering thereon and disposed in opposing relation to said screen substantially at the point of doctoring under a pressure sufficient to deform said covering into nip relation with said screen over said extended arcuate surface area.

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