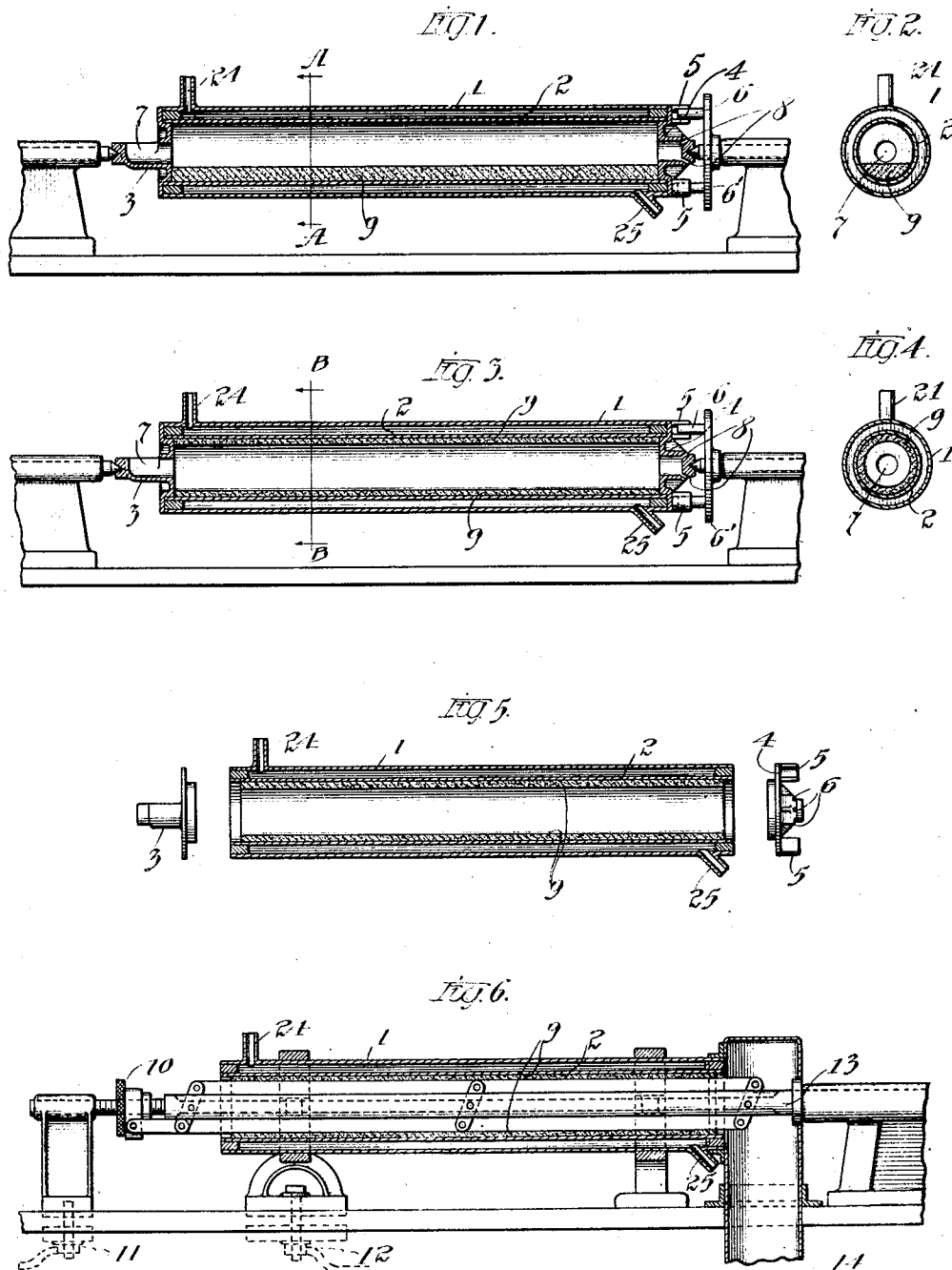


F. H. WOLEVER.
PROCESS OF MANUFACTURING ROLLERS.
APPLICATION FILED AUG. 18, 1913

1,161,756.

Patented Nov. 23, 1915.

3 SHEETS—SHEET 1.



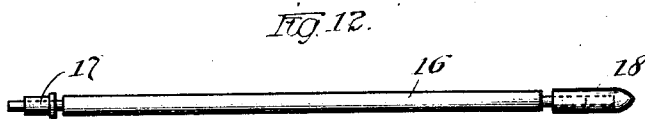
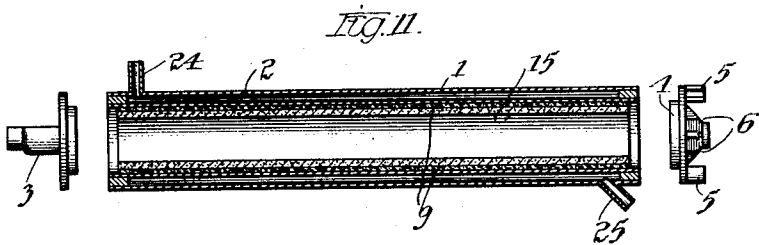
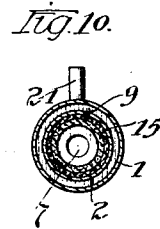
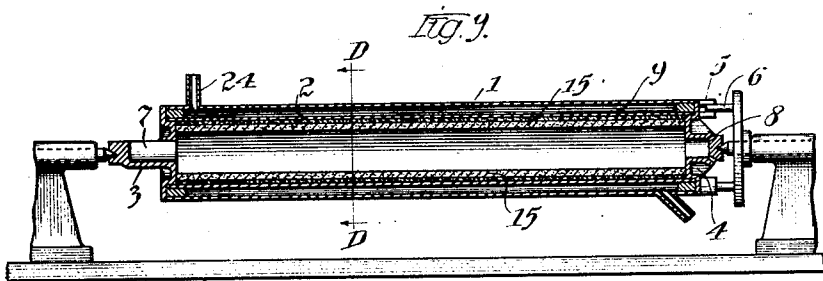
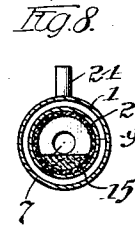
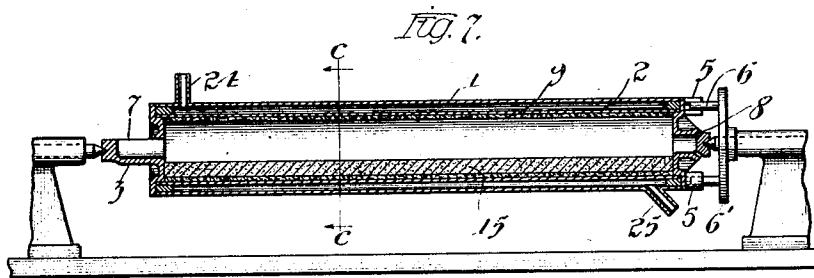
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3 SHEETS—SHEET 2.



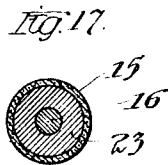
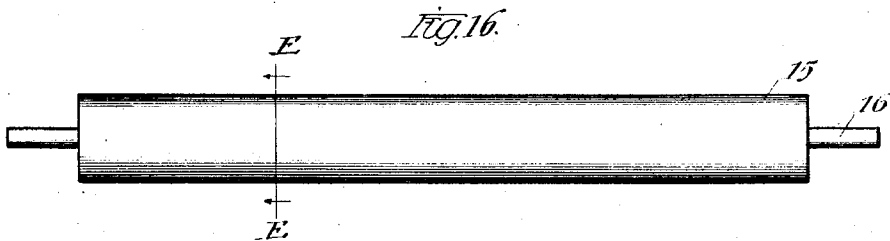
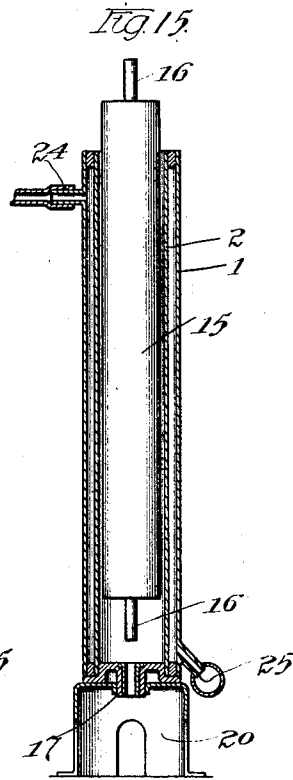
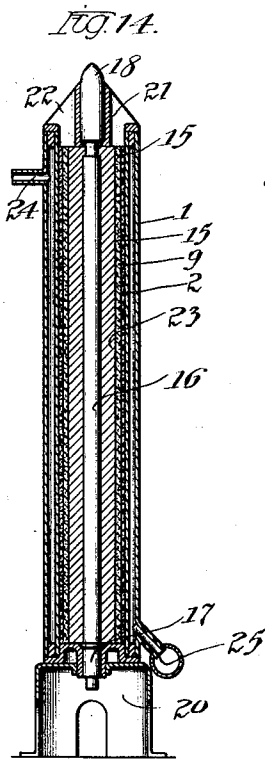
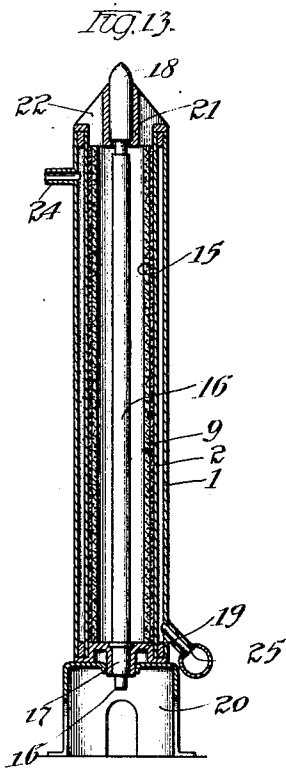
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1,161,756.

Patented Nov. 23, 1915.
3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

FRANKLIN HENRY WOLEVER, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO IDEAL ROLLER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE.

PROCESS OF MANUFACTURING ROLLERS.

1,161,756.

Specification of Letters Patent.

Patented Nov. 23, 1915.

Application filed August 18, 1913. Serial No. 785,367.

To all whom it may concern:

Be it known that I, FRANKLIN H. WOLEVER, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in the Process of Manufacturing Rollers, of which the following is a specification.

This invention relates to a novel process for producing a compound roller for printing presses, typewriting machines, clothes wringers and other uses, and the invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

A roller embodying my invention embraces a central core of high resiliency and an outer or face layer of tough exterior formed on the core, said core and face layer being preferably composed largely of vulcanized oil.

A roller embodying my invention and constructed in accordance with my novel process is especially adapted for use as a distributing roller for printing presses, in which use it is subjected to wide ranges of temperature and humidity, and wherein the requirements are for a roller which will retain its contour and a uniform hardness under all practical conditions of use and from which ink may be rapidly and completely removed.

Inasmuch as the conditions of use of a printing press roller are, perhaps, more severe than will be found in any other uses of such rollers, emphasis is hereafter made to those qualities which especially fit the roller for printing press use and to comparison of my improved roller to known rollers.

Heretofore various attempts have been made to produce distributing rollers for printing presses of a character to withstand the variable conditions of temperature and humidity of the surrounding atmosphere to which such rollers are subjected and of a character to enable the roller to be operated equally well at low and high speeds, so as to prevent distortion of the cross section of the rollers and variableness in diameter both when in use and when stored in the racks; and also of a character to permit the ink to be readily and completely removed therefrom after use. Such efforts, so far as I am

aware, have not resulted in a roller possessing the characteristics desired. Consequently, the ink distributing roller of a printing press has presented and now presents a serious problem in practice.

It is among the objects of my invention to provide a roller, suitable as a distributing roller for printing presses, and a process for making same, wherein the roller is not affected by the wide ranges of temperature and humidity encountered in a printing room and, therefore, a roller which does not become unduly softened under high operating temperatures or which does not become unduly hardened under, what may be termed, abnormally low temperatures.

Another object of the invention is to provide a roller of such nature and characteristics that it will not absorb moisture from the atmosphere under relatively high humidities, such as will tend to cause the roller to become larger in diameter and softer in texture, and which, on the other hand, does not tend to lose its moisture when operating in dry temperatures, such as would cause the roller to shrink and harden; either of which conditions will render the roller unfit for its intended use. By producing a roller in which the interchange of moisture from the atmosphere to the roller, and vice versa, is minimized, I am enabled to avoid distortion and variableness of size of the roller, which occurs where such interchange is appreciable or substantial. Moreover the absorption or elimination of moisture to and from the roller, respectively, does not occur uniformly in the prior rollers on account of an unequal distribution of moisture therein, and the swelling or shrinkage of the roller, due to moisture variations, tends to produce an unsymmetrical cross section and periphery.

Another object of the invention is to provide a roller which will not be deformed when suspended in the rack due to varying conditions of temperature and moisture.

A further object of the invention is to provide a roller having a surface finish or layer of such character and texture as not to be effected by inks ordinarily used in printing processes, and which, therefore, may be kept in cleanly and usable condition.

Another object of the invention is to provide a roller which, when operated at high

speed and over long periods of time, will not tend to break down by reason of the temperature or other conditions.

In order to attain these and other objects and results I have perfected an improved process of making rollers, and from an improved material and have produced a roller which will maintain its characteristics of hardness, contour and ink resisting qualities under a wide range of temperature as, for instance, a range of 250 degrees Fahrenheit. These characteristics of my roller also permit the same to be stored in racks, when not used, under corresponding wide ranges of temperature and moisture without liability to deformity. Moreover, a roller made in accordance with my novel process and embodying my invention, may be interchangeably used in what has heretofore been regarded as high and low temperature work, and without the necessity of preliminary heating of the roller prior to its comparatively high temperature work; and consequently without the liability of melting a roller under conditions of high temperature, such as would occur with prior rollers designed for comparatively low temperature work.

The material from which my improved roller is made is preferably a vulcanized oil, such as corn oil. The core and the outer or face layer of the roller may be made from the same character of oil, though treated somewhat differently, so that the core shall possess a comparatively high resilience, while the outer or face layer is tough and homogeneous. It is necessary in order to produce this tough or homogeneous outer or face layer that, after the material has been poured into the mold, and before it solidifies, all the air, gas and moisture, or as nearly as may be, shall be driven therefrom. The roller face is, therefore, anhydrous so that it will not become deformed or shrunken or hardened by elimination of moisture, and said material possesses no affinity for moisture, so that the roller will not become deformed, enlarged and softened by the absorption of moisture. An advantage realized in driving the air and moisture from the outer layer resides, not only in making the layer moisture-proof but it is also valuable because the surface itself is thereby free from air holes and like irregularities.

In producing a roller in accordance with my novel process, I first line the cylindric or other formed mold to produce a smooth, solid lining. This may be effected by pouring into the mold a quantity of melted paraffin or like material and thereafter rotating the mold at high speed so as to throw the melted paraffin outwardly against the inner cylindric wall of the mold which, upon hardening, produces a lining which is capable of

being finished with a smooth and true inner wall and which may be finished to present an inner molding face of the cross section desired to produce a final roll of a given or predetermined diameter, and one which is so smooth as to give a uniformly smooth surface to the roller face layer thereafter formed thereon. Thereafter the mold lining is subjected to a reaming operation to bring the same to an internal diameter equal to the desired outer diameter of the face layer of the roller to be formed therein. Thereafter the material to form the outer or face layer of the roller is poured into the mold thus lined and the mold is again rapidly rotated so that the said layer forming material is thrown outwardly by centrifugal force against the forming face of the mold lining. This centrifugal action is continued until the material to constitute the outer layer of the roller solidifies. The centrifugal force developed during the rotation of the mold acts to force the air, gases and moisture from the material before it becomes solidified, thereby producing a tough, homogeneous layer which is free from moisture and air holes and is peripherally smooth and symmetrical. Thereafter, the material to constitute the inner elastic core is poured into the central space surrounded by the previously formed face layer of the roller, and, if a shaft is to be incorporated in the roller said shaft is properly centered in the mold prior to pouring the material constituting the core. This core material may be poured in any suitable manner and, by reason of the desired elasticity of the core as compared to the face layer of the roller, no special means are required to eliminate therefrom the moisture, gases and air while the material hardens. Thereafter, heat is applied to the mold lining in contact with which the outer layer has been formed and on which it is hardened so as to raise the temperature of said lining to an extent to release the finished roller and permit it to be pulled endwise from the mold.

I have shown in the drawings the essential elements of an apparatus for practising my improved process, wherein:—

Figure 1 is an axial section of a mold in a centrifugal machine prior to the operation of lining the mold. Fig. 2 is a cross section taken on the line A—A of Fig. 1. Fig. 3 is a view similar to Fig. 1 after the mold has been lined. Fig. 4 is a cross section on the line B—B of Fig. 3. Fig. 5 is an axial section of the lined mold, with the end caps removed. Fig. 6 is an axial section of the mold showing the same in a reaming machine for reaming the mold lining. Fig. 7 is an axial section of the lined mold, in a centrifugal machine, showing therein the body of material to constitute the facing

layer. Fig. 8 is a section on the line C—C of Fig. 7. Fig. 9 is a section similar to Fig. 7 after the face layer of the roller has been formed. Fig. 10 is a section on the line D—D of Fig. 9. Fig. 11 is an axial section of the mold and roller facing layer, with the end caps removed. Fig. 12 is a side elevation of a stock or shaft for the roller. Fig. 13 illustrates, in axial section, the mold with the stock therein in readiness to receive the core material of the roller. Fig. 14 is a similar section after the material to constitute the core has been poured. Fig. 15 is a similar view showing the core partially withdrawn. Fig. 16 is a side elevation of the finished roller. Fig. 17 is a section on the line E—E of Fig. 16.

In Fig. 1 is illustrated the permanent parts of the mold or the essential elements thereof. In said figure, 1 designates the mold fitted with a hot water or steam jacket 2 and with removable end caps 3 and 4. The cap 3 has an axial extension which serves as a center bearing of the mold in a centrifugal machine. The mold is driven by means of hollow lugs 5 on the end cap 4 which are engaged by driving lugs 6 attached to a disk 6' constituting part of the driving device of the centrifugal machine. The axial extension of the cap 3 is provided with a trough 7 through which material is poured into the mold 1. A series of holes 8 in the cap 4 are provided to allow air to circulate and to drive out the gases within the mold during the molding of the roller shell or face layer, and this elimination of the gases from the hollow mold may be effected in any preferred efficient manner.

In the use of this apparatus in practicing my process the caps 3 and 4 are coated with liquid paraffin and are then inserted into the ends of the mold. The mold is then centered in a centrifugal machine with the trough 7 opening upwardly. A proper amount of hot paraffin or other suitable lining material is now introduced through the trough 7 into the interior of the mold, the amount of such material being governed by the diameter of the proposed roller to be cast in the mold. Fig. 2 is a cross section of Fig. 1 after the paraffin has been poured, the body of the paraffin being indicated by 9. The mold and the contained paraffin is now rotated at a suitably high speed as, for instance, 300 revolutions per minute, and the action of centrifugal force serves to throw the paraffin outwardly over the mold wall to form a lining of uniform thickness, the lining solidifying during the rotation of the mold to constitute the finished lining 9, shown in Figs. 3 and 4. The operating temperature of the mold and lining material to be observed during the forming of the mold lining will depend upon the character of the lining material and also the temperature of

the surrounding atmosphere. Thereafter the end caps 3 and 4 are removed, as shown in Fig. 5, they being heated to a temperature to melt the paraffin to facilitate the removal. Thereafter the mold, with the end caps removed, is placed in a reaming machine, as shown in Fig. 6, in which machine the inner surface of the lining is reamed out to a proper interior diameter to correspond with the exterior diameter of the proposed finished roller. The said mold is placed in the adjusting clamps of the reaming machine, wherein 10 is an adjusting screw, 11 and 12 clamps, 13 a boring bar and 14 an exhaust duct through which the paraffin shavings are removed. After the paraffin liner has been reamed out to the proposed outside diameter of the finished roller, the mold is removed from the reaming machine. The end caps 3 and 4 are thereafter recoated with paraffin and are replaced and the mold is again set up in the centrifugal machine for the shell or outer layer pouring, as shown in Fig. 7. Thereafter, oil which has been prepared by a partial vulcanizing process is mixed with a further vulcanizing acid, such, for instance, as sulfur chlorid in a liquid state is poured into the mold through the trough 7. Enough of the compound is introduced into the shell or liner 9 to produce the outer layer of the roller of approximately one-fourth of an inch in thickness depending, however, upon the overall diameter of the roller, and other conditions. After the fluid has been poured into the mold, the mold is again rotated at a suitably high speed of 200 or more revolutions per minute, until the compound has been forced outwardly by centrifugal force and laid upon the lining 9 to form a shell 15 of uniform thickness and has hardened to maintain permanent shape. The speed at which the mold should be rotated will be governed, to some extent, by the barometric and humidity variations. While the mold is being rotated the compound undergoes a chemical change, which raises its temperature, and the resulting exuding gases will only have to travel through the thickness of the layer 15 to the interior of the forming shell or layer from which the gases will escape through the openings 8 in the cap 4 by their own pressure or assisted by auxiliary circulation. There is, therefore, no possibility for the gases to be pocketed in the compound of the face layer or shell before it has become solidified. This gives the roller a very smooth surface and a homogeneous texture and drives out all of the moisture from the compound.

Figs. 9 and 10 illustrate the mold after the shell compound has, by centrifugal force, been formed on the liner 9 and has solidified. After the solidification of the layer 15, the mold is again taken from the centrifugal machine and the caps 3 and 4

heated and removed, as shown in Fig. 11. The mold is now set up for the last pour, or to pour therein the material which constitutes the core 23 of the roller. The position of the mold for the last pour is shown in Fig. 13, it occupying this time a vertical position. Before the material for the roller core is poured into the tubular outer or face layer 15 of the roller, the roller stock or shaft 16, fitted with a head bushing 18 and a foot bushing 17, is centered in the mold. As herein shown, a sub-base 20 is fixed on a suitable support and the base cap 19 is set thereon, said cap being suitably recessed to receive the base bushing 17. The stock 16 with the base bushing slipped thereon is now erected on the base 19. The mold with the lining 9 and the face layer 15 therein is then slipped over the stock, and a spider cap 21, with an opening or openings 22 therein through which fluid may be poured to the interior of the mold, is set on the upper end of the mold, the head bushing fitting to the central opening or socket of the spider cap 21, as shown in Fig. 13. The same compound that is used for the shell or face layer 15 is now poured into the mold through openings 22 until the space between the roller stock or shaft 16 and the outside layer 15 is filled, as shown in Fig. 14. The heat of the body of melted material to constitute the core, when the material is poured into the tubular face layer due to vulcanization, serves to slightly fuse the surfaces of said layer, so that, upon final solidification, a bond is afforded between the core and face layer which holds the roller elements in fixed relation to each other. Before the core has entirely solidified, the frothy top of the composition may be scooped out and replaced with more of the compound so that a core of uniform solidity is produced. Thereafter, the completed roller is drawn from the mold, as shown in Fig. 15. During such drawing operation, steam or hot water is admitted to the steam jacket 2 through the induction pipe 24, circulation being maintained through the exhaust outlet 25 until the paraffin is melted. The cap and the top bushing are now removed and the roller, being free, can be lifted from the mold. While the roller compound is still warm, it may be washed with gasoline or like cleaning fluid until all traces of paraffin are removed.

The finished roller is shown in Figs. 16 and 17. The outer layer 15 is tough and perfectly smooth, homogeneous and resilient, while the inner backing or core 23 is resilient and slightly porous.

While it has been stated that the core compound may be of the same material as the face layer 15, I do not wish or intend to limit myself in this respect, as it may be

advantageous or advisable to alter the outer layer or shell compound and make it harder and tougher than the core compound. For instance, when employing a corn oil compound for the body or core of the roller, I may employ a linseed oil compound for the face layer thereof. I desire it to be understood, therefore, that the invention is not limited to the specific steps and elements herein set forth but that it is my intention to claim all of novelty that is inherent in the disclosure.

The product herein disclosed is not made the subject of claims of this application but is claimed in a divisional application filed on the 4th day of August, 1915, Serial No. 23,546.

I claim as my invention:—

1. The improvement in the art of molding rollers, which consists in the steps of lining the roller mold with a material having a lower fusing point than the roller material, casting the roller in the lined mold, heating said lining to release the roller, and finally withdrawing the roller.
2. The improvement in the art of molding rollers, which consists in applying by centrifugal action a fusible lining to the mold wall while the lining material solidifies, thereafter casting the roller in the lined mold against said lining and finally displacing the lining to withdraw the roller from the mold.
3. The improvement in the art of molding rollers, which consists in applying by centrifugal action a lining to the mold while the lining material solidifies, thereafter casting the roller in the mold, thereafter heating said lining to release the roller, and finally withdrawing the roller from said mold.
4. The improvement in the art of molding rollers, which consists in the steps of lining the mold, reaming out the lining to a desired diameter supplying a roller facing layer material to the mold, applying the material to the lining by centrifugal action to produce a roller facing layer shell, and thereafter completing the roller.
5. The improvement in the art of molding rollers, which consists in the steps of lining a hollow mold with a material having a lower fusing point than that of the face layer of the roller, supplying to the lined mold a charge of liquid material to form the face layer of the roller, forming said face layer against the mold lining by centrifugal action, and allowing the material to harden, heating said mold lining to release the roller and finally withdrawing the roller from the mold.
6. The improvement in the art of molding rollers, which consists in the steps of lining a hollow mold with a material having a lower fusing point than that of the face

layer of the roller, supplying to the lined mold a charge of liquid material to form the face layer of the roller, forming said face layer against the mold lining by centrifugal action, pouring within the face layer or shell material which hardens to constitute the roller core, and finally removing the roller from the mold.

7. The improvement in the art of molding rollers, which consists in the steps of lining the mold supplying a roller facing layer material to the mold, applying the material to the mold lining by centrifugal action to produce a roller facing layer or shell, expelling gases, air and moisture from the roller facing layer during its formation, and thereafter completing the roller.

8. The improvement in the art of producing compound rollers composed of a resilient core and a tough, homogeneous face layer, which consists in the steps of lining the mold, forming a face layer on the mold lining, thereafter forming the core within the tubular face layer, bonding the said layer and core, and thereafter removing the completed roller from the mold.

9. The improvement in the art of producing compound rollers composed of a resilient core and a tough, homogeneous face layer, which consists in the steps of lining the mold with a material having a fusing point lower than that of the roller facing layer, forming by centrifugal action a tubular roller face layer on the mold lining, thereafter pouring into the tubular face layer the core material which, upon solidifying bonds with the face layer, thereafter heating the mold lining to release the roller, and finally withdrawing the roller.

10. The improvement in the art of producing compound rollers consisting of an elastic core and a tough, homogeneous face layer, which consists in the steps of forming a tubular face layer in the mold by centrifugal action and simultaneously effecting a vulcanizing action of the material of said layer, and thereafter molding the core within said tubular face layer.

11. The improvement in the art of producing compound rollers consisting of an elastic core and a tough, homogeneous face layer, which consists in the steps of forming a tubular face layer in the mold by centrifugal action and simultaneously effecting a vulcanizing action of the material of said layer, and thereafter molding a core within the face layer while simultaneously subjecting the material to a vulcanizing process

which heats the same and the previously formed face layer so that, upon solidification, bonding between the elements of the compound roller is effected.

12. The improvement in the art of producing a compound roller composed of the elements of an elastic core and a surrounding tough, homogeneous elastic layer, which consists in first forming the outer roller element, thereafter centering a stock therein and thereafter forming the inner roller element between the stock and the outer element, and finally bonding the roller elements together in assembled relation.

13. The improvement in the art of producing a compound roller composed of the elements of an elastic core and a surrounding, tough homogeneous elastic layer, which consists in first lining the mold, thereafter forming the outer shell or layer, thereafter centering the stock in the mold, and thereafter forming the core within and bonding it to the face layer.

14. The improvement in the art of molding rollers, which consists in applying by centrifugal action a fusible lining to the mold wall, boring out said lining to the desired internal diameter and thereafter casting the roller in the mold against said lining.

15. The process of manufacturing rollers from a vulcanized oil compound, which consists in placing within a rotatable mold a quantity of lining material, rotating said mold until the lining has solidified and the centrifugal force of rotation has deposited it in an even layer circumferentially against the inside of the mold, boring out said lining to a definite diameter, placing within the lining a quantity of liquid vulcanized oil compound, rotating the mold with the liquid vulcanized oil compound during chemical solidification until the centrifugal force of rotation has deposited the vulcanized oil compound in an even layer against the lining, centering within said lining a shaft or stock, filling the space between the shaft and the layer of vulcanized oil compound with a core compound and allowing it to solidify, and thereafter admitting a heating agent to a jacket around the mold to melt the lining to release the roller.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FRANKLIN HENRY WOLEVER.

Witnesses:

S. R. CLUTE,
EDWIN B. MAYER.