W. M. WHEILDON AND E. H. ANGIER.

WRAPPING MACHINE FOR ANNULAR ARTICLES.

APPLICATION FILED APR. 26, 1917.

1,380,448.

Patented June 7, 1921.

3 SHEETS—SHEET 1.

Fig. 1.

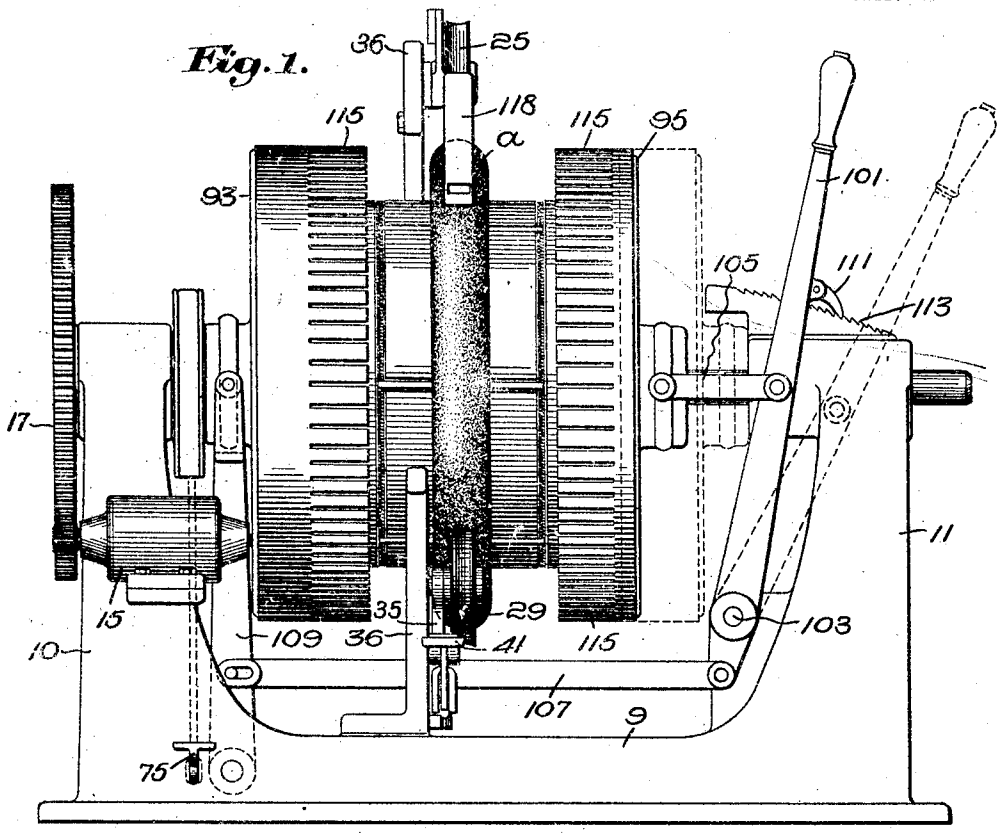
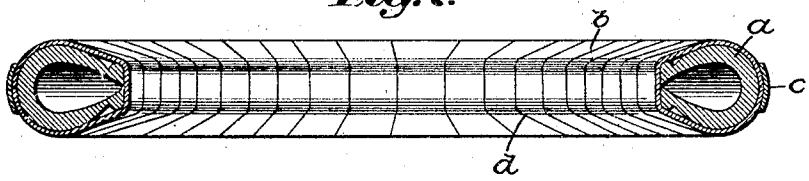


Fig. 2.



Inventors:
Edward H. Angier,
William M. Wheildon.
by Emery, Booth, Jamey & Varney
Attys.

W. M. WHEILDON AND E. H. ANGIER.

WRAPPING MACHINE FOR ANNULAR ARTICLES.

APPLICATION FILED APR. 26, 1917.

1,380,448. **Patented June 7, 1921.**

3 SHEETS—SHEET 2.

Fig. 2.

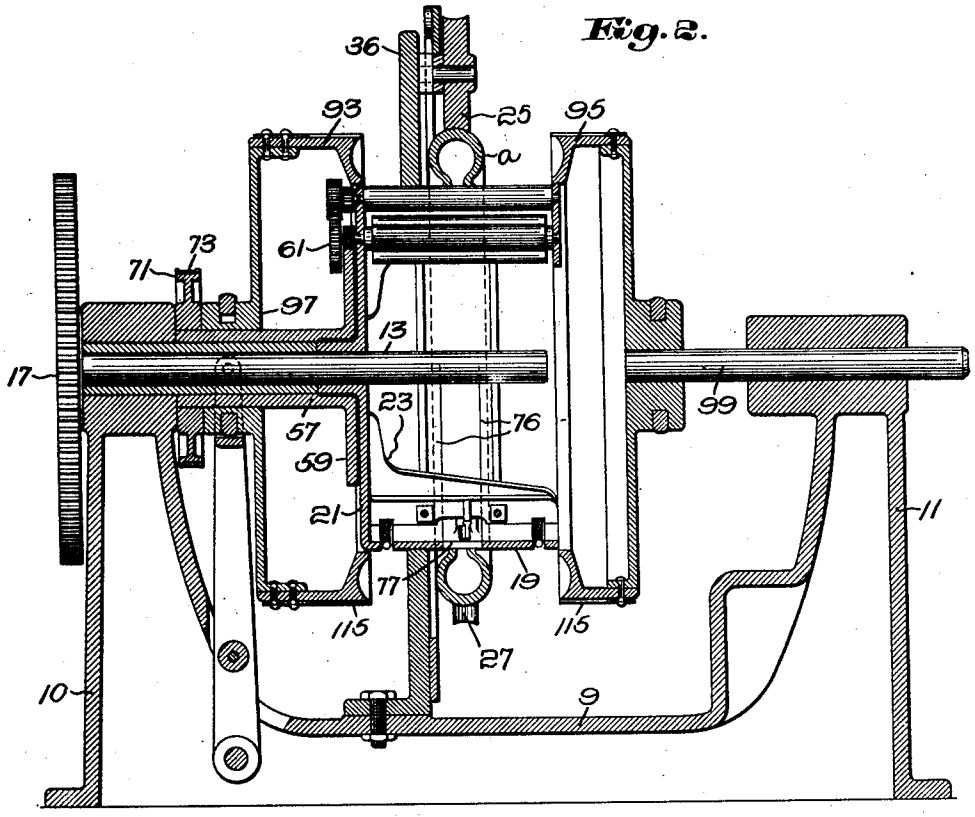


Fig. 6.

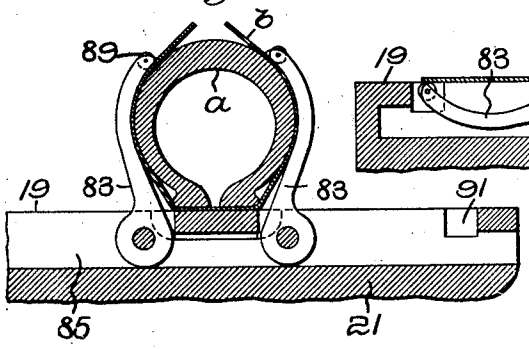
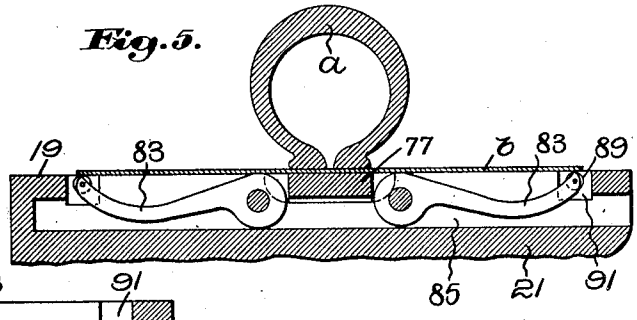


Fig. 5.



Inventors:
Edward H. Angier,
William M. Wheildon,
by Emery, Booth, Jamey & Varney
Attys.

W. M. WHEILDON AND E. H. ANGIER.

WRAPPING MACHINE FOR ANNULAR ARTICLES.

APPLICATION FILED APR. 26, 1917.

1,380,448. Patented June 7, 1921.

3 SHEETS—SHEET 3.

Fig. 3.

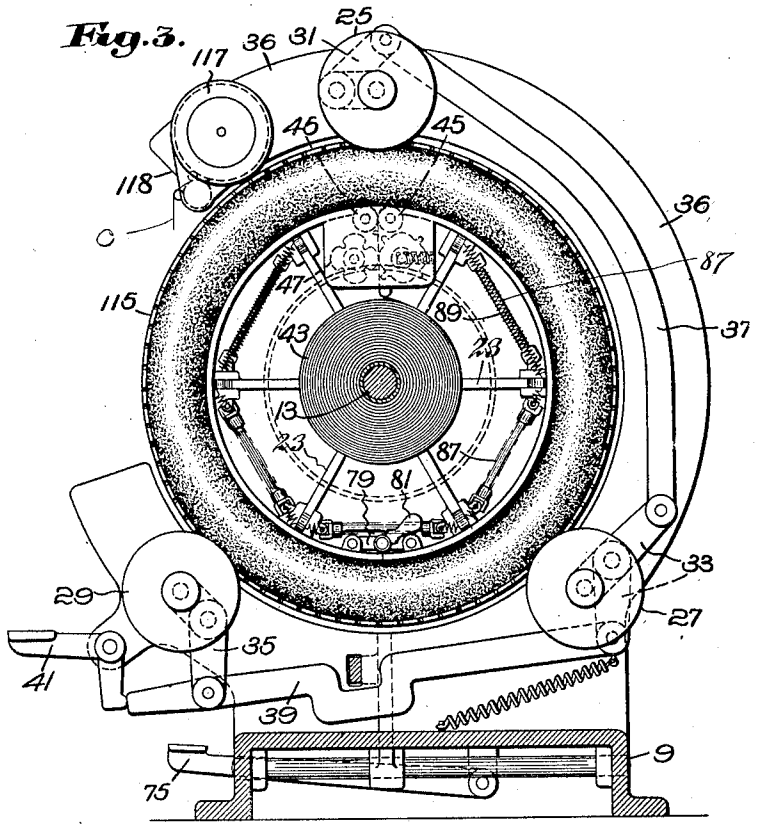
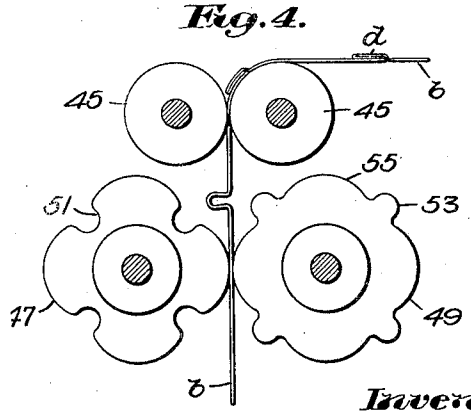


Fig. 4.



Inventors:
Edward H. Angier,
William M. Wheildon,
by Emery, Booth, Jamey & Varney
Attys.

UNITED STATES PATENT OFFICE.

WILLIAM M. WHEILDON, OF ASHLAND, AND EDWARD H. ANGIER, OF FRAMINGHAM, MASSACHUSETTS; SAID WHEILDON ASSIGNOR TO SAID ANGIER.

WRAPPING-MACHINE FOR ANNULAR ARTICLES.

1,380,448. Specification of Letters Patent. **Patented June 7, 1921.**

Application filed April 26, 1917. Serial No. 164,825.

To all whom it may concern:

Be it known that we, WILLIAM M. WHEILDON and EDWARD H. ANGIER, citizens of the United States, and residents of Ashland and Framingham, respectively, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Wrapping-Machines for Annular Articles, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to wrapping machines and the purpose is to provide a device which will neatly and expeditiously wrap an annular article, such for example as a pneumatic vehicle tire, with a strip of paper.

Our invention will best be understood by reference to the following description of an illustrative embodiment thereof shown in the accompanying drawings wherein:—

Figure 1 is a front elevation of one suitable form of machine;

Fig. 2 is a central longitudinal section;

Fig. 3 is a transverse section;

Fig. 4 is a detail of the mechanism used for plaiting the wrapping strip;

Figs. 5 and 6 are sections taken along one of the elements of the cylindrical supporting drum and show the parts in different positions which they take during the operation of the machine; and

Fig. 7 is a central transverse section through a vehicle tire shoe inclosed in a wrapping applied by the machine shown.

While our invention is applicable for use in wrapping various annular or toric articles a conspicuous instance of such an article is a pneumatic vehicle tire and for convenience in description we shall refer to a tire as exemplary of other articles of similar form and we have herein shown the machine at work in wrapping a tire.

An understanding of the mechanism herein disclosed will be facilitated by a brief description of the package formed by its operation. We refer therefore to Fig. 7 in which we have shown a pneumatic tire shoe inclosed in a wrapping such as would be applied by the machine illustrated. The tire *a* is inclosed by a strip of paper *b*, fitting the cross sectional circumference thereof. This strip of paper *b* encircles the inner circumference of the tire and has edges inclosing the sides of the tire and presented in opposition to each other, herein adjacent the tread, where they are secured together as for example by means of a sealing strip *c*. It will be understood that the circumference of the tire is greater from the rim side outwardly. In order to permit the paper to be fitted to the shape of the tire therefore it is provided with transverse plaits *d* and as the edges of the paper strip extend up around the tire sides these plaits are opened out to a greater or less extent as may be necessary to accommodate the increased dimension of the tire.

Referring therefore to the mechanism chosen for illustration, and referring particularly to Figs. 1 and 2, the machine shown embodies a suitable frame 9, having standards 10 and 11 at either end, in one of which as the standard 10 at the left of Fig. 1 is journaled a shaft 13. As shown in Fig. 1, this shaft may be driven from an electric motor 15 mounted on one of the standards by means of a suitable train of gearing 17.

The shaft 13 carries a support for the tire which is to be wrapped, which support herein takes the form of a drum 19, the cylindrical surface of which is a flange extending from a disk 21 fixed on the shaft. The surface of the drum may also be supported by webs 23, the outer portions of which are conveniently bifurcated, as seen best in Fig. 3, for a purpose presently to be described.

With certain parts in the dotted line position shown in Fig. 1, description of which parts we for the present postpone, the tire *a* may be placed upon the drum 19. Guiding and centering means are provided for the tire, conveniently in the form of rolls 25, 27 and 29, which form a set concentric with the drum 19. To move these supporting rolls in and out away from the center of the drum, to permit the tire to be placed in position and then to be engaged by the rolls, which, as seen in Figs. 1 and 2, conveniently have concave peripheries to fit the tire tread, the several rolls are mounted (Fig. 3) on bell-crank levers 31, 33 and 35 pivoted on an arc shaped plate 36 which rises from the base 9 and partially encircles drum 19. The several levers are connected by links 37 and 39 arranged to be actuated by the foot pedal 41 which will swing the

bell-cranks so as to move the several rolls outwardly and thus permit the tire to be assembled with the drum. After the tire is in position the pedal 41 may be released and the rolls will close into contact with the tread of the tire as illustrated in Fig. 3.

As has been explained, the purpose of the machine here shown is to wrap the tire with a strip of paper which extends integrally over the inner circumference thereof and has its edges joined to form a complete inclosing casing. We have furthermore explained that the paper is fitted to the tire by plaits. The strip of paper which is used in wrapping the tire is therefore assembled therewith on the drum inwardly of the tire itself, the drum forming a supporting surface for the paper strip *b* as best seen in Fig. 5. In the present embodiment of the invention a roll of suitable paper 43, seen in Fig. 3, is mounted on the shaft 13 within the drum, the width of this paper being adapted for the purpose intended and preferably not greater than the width of the drum. The end of this paper strip may be led through a transverse slit in the surface of the drum at which are conveniently mounted rolls 45 (see Fig. 3) and so may be drawn out to the surface of the drum either before or after the tire is put in place.

In the machine illustrated I have provided mechanism for plaiting the paper strip as it is brought from the roll 43 to the outer surface of the drum 19 for use. For this purpose we may utilize any suitable mechanism but conveniently that shown more in detail in Fig. 4 with reference to which figure and to Fig. 3 we shall next proceed to describe it.

Referring to Fig. 4 the paper strip is led from the roll 43, between rolls 47 and 49, the roll 47 being a driven roll. Roll 47 is provided with suitable recesses 51 adapted to cooperate with teeth 53 on the roll 49. As the strip *b* is fed through the rolls it will be apparent that the teeth 53 will force it into the recesses 51 and will gather it into a succession of open loops. To fold these loops down into flat plaits the portions 55 of the roll 49 between the teeth 53 are formed as rises or portions of greater radius so that, as the rolls turn and these parts come into cooperation with the strip, it will be fed forward faster than at other times. It is clear that this action will tend to shut up the mouth of the loop which has just been made by a coöperating tooth and recess and that the strip is thus delivered to the rolls 45 with the portions on either side of the loop in close proximity and that the rolls 45 therefore will roll down the loop portion into a flat plait as illustrated. As seen in Fig. 3, the shaft of the roll 49 is yieldably mounted to permit the high points 55 to pass the roll 47.

Suitable means may be provided for driving the rolls 45, 47 and 49 in coördination with movement of the drum 19 or to permit them to be idle while the drum moves. For this purpose (see Fig. 2) the shaft 13 carries a sleeve 57 on which is a gear 59 meshing with a pinion 61 through which the several rolls are driven. The sleeve 57, which will normally rotate with the drum 19, carries a brake drum 71 to which is adjusted a band brake 73 which may be operated by pedal 75 (Fig. 1). It will be understood that if the brake is put on by depressing the pedal 75 that the gear 59 will be held stationary and if the drum rotates carrying with it the several rolls, the rolls themselves will be driven. On the other hand, if the brake is loosened the gear will turn with the drum 19 and there will be no relative movement of the gear and the drum to cause independent revolution of the rolls.

In order to coördinate the parts already described we will next briefly describe the preliminary operations of wrapping the tire. Assuming the parts of the machine to be in the dotted line position seen in Fig. 1 so that the right hand side of the drum 19 is unencumbered, the operator will depress the pedal 41 thereby moving the rolls 25, 27 and 29 outwardly. He may then slip a tire onto the surface of the drum and into the plane of the rolls. The pedal is then released and the rolls will close on the outer surface of the tire *a* as indicated in Fig. 1. The end of the paper strip projecting through the rolls 45 is then seized by the operator and with his foot on the pedal 75 the motor 15 is started, revolving the drum 19 through the shaft 13, while the gear 59 is held stationary by means of band brake 73 so as to cause independent rotation of the plaiting rolls 47 and 49 and the feed rolls 45. A band of paper will thus be drawn from the inner part of the drum onto the surface thereof beneath the tire and it will be spread over the surface of the drum in plaited form. After a suitable length of the strip has been drawn out it may be severed in any suitable manner and if desired the ends may be joined by adhesive.

The tire may then be clamped firmly in position and the paper pressed tightly against the inner surface thereof. For this purpose the drum 19 (Fig. 2) has two circumferential slits 76 extending through a considerable portion of its circumference to provide a partially independent portion 77 on which the tire rests. This portion 77 is split at one point as indicated in Fig. 2 and a toggle 79 (Fig. 3) with a suitable operating handle 81 is provided to permit the circumference of this portion of the drum to be slightly increased or decreased. After the drum and paper are in position the toggle 79 is straightened by means of the handle 81

and the tire and paper thus firmly secured in position.

We shall next describe the mechanism whereby the edges of the strip of paper are raised from the surface of the drum and folded up about the sides of the tire and in doing so we shall refer chiefly to Figs. 3, 5 and 6. At suitable points about the circumference of the drum are pivoted folding arms 83, conveniently in opposed pairs. Corresponding elements of each pair form a set which is pivoted on a circumferential line adjacent the tire holding portion 77 of the drum. The surface of the drum may be provided with slots 85 to receive these arms, the bifurcated outer portions of the webs 23, clearly seen in Figs. 2 and 3, providing for the support of the drum at either side of these slots. As seen in Fig. 3, connecting members 87 are provided connected by universal joints, as shown, to the arms at their pivotal points, so that movement of one arm of the set will cause corresponding movement of the other arms. The tire, paper strip and folding arms 85 being in the position shown in Fig. 5, the operator will grasp one arm of each set and fold the two upwardly to the position shown in Fig. 6 and it will be understood that because of the connecting members 87 the other pairs of arms all around the circumference of the tire will be similarly actuated and consequently the paper strip *b* will be folded up around the sides of the tire all around its circumference and that the several plaits therein will open out to permit it to be thus folded. In order to insure smooth and uniform application of the paper to the sides of the tire the outer ends of the arm 85 are connected by close wound springs 89, best seen in Fig. 3, so that the paper is subjected to a folding and smoothing out action all around the circumference. The springs 89 considered as a unit form an expansible and contractible ring which is normally positioned free of the tire but of which the circumference may be altered to move the paper and press it against the sides of the tire throughout the circumference of the same. As best seen in Figs. 5 and 6 the surface of the drum may be provided with circumferential slots 91 to receive the springs 89 when the arms 83 are folded down. When the arms are in this position the springs will assume a polygonal form as shown in Fig. 3 and will exert no tendency to lift the arms 83 from the slots 85.

After the paper has been folded up about the tire in the manner illustrated in Fig. 6 it is preferable to provide means for more closely fitting it thereto and for smoothing out the plaits more neatly than might be possible because of their spontaneous opening when the paper is forced outwardly by arms 83 and connecting springs 89. For this purpose I provide mold members 93 and 95 having faces corresponding to the profile of the tire. The member 93 is carried by a sleeve 97 slidable as regards the shaft 13, as will be readily understood from inspection of Fig. 2, so that it may stand clear of the drum 19 as illustrated in that figure or be moved over the surface thereof into coöperation with the sides of the tire. The member 95 is mounted on a shaft 99 slidable in a bearing in the left-hand standard 11, the shaft 99 being in alinement with the shaft 13. Member 95 has three positions. First the dotted line position of Fig. 1 which is further to the right than the position illustrated in Fig. 2. In this position the member 95 is spaced away from the shaft 13 and drum 19 providing a space through which the tire may be introduced to place it upon the circumference of the drum. The second position is that shown in the drawing. The third position is farther to the left so that the face of the member 95 coöperates with the side of the tire and presses the paper therearound.

The mold members 93 and 95, as seen in Fig. 1, may be actuated by a handle 101 pivoted to the frame at 103 and connected by a link 105 to a hub on member 95. The lever 101 also carries a link 107 secured by a lost motion connection to a lever 109 pivoted on the frame and having a bifurcated end secured to the hub of member 93. The lever 105 may be provided with a dog 111 adapted to coöperate with a rack 113 on the frame to hold the lever in adjusted position.

Assuming the parts to be as shown in Fig. 1, if the dog is raised and the lever swung to the right to the dotted line position the mold member 95 will be carried to the right to the dotted line position. This movement of the lever will of course swing the link 107 to the left but the lost motion connection of the link permits the member 93 to stay at rest. The parts of the machine are now in position to permit the tire to be placed upon the support of the drum. The lever 101 may then be rocked to the right to the full line position thus returning the member 95. After the arms 83 have acted as described to fold the edges of the paper *b* about the sides of the tire, they are again swung down to the position shown in Fig. 5 and the lever 101 is rocked still farther to the left advancing both of the members 93 and 95 into coöperation with the sides of the tire.

As best seen in Fig. 1 the outer surfaces of the mold members may be provided with series of spring fingers 115, inwardly directed. This construction allows for expansion and provides a drawing action which tightens the wrapper about the tire and folds over the extreme edges of the paper into close proximity ready for sealing.

If desired the motor 15 may now be start-

ed while the mold members are in position, the pedal 75 being released so that the rolls which feed the paper strip will not move. The motor will act to revolve the drum 19 with the tire thereon between the mold members and the latter will smooth out the various plaitings and provide a neat package.

To complete the package it is only necessary to secure the edges of the paper *b*. This is conveniently done by means of a circumferential sealing strip *c* of which a roll 117 (see Fig. 3) may be carried in a suitable casing 118 supported above the tread of the tire and convenient to the operator. A suitable moistening device, either to moisten dry adhesive on the sealing strip or to apply adhesive thereto may be provided. The operator grasps the end of the strip *c* and applies it to the package bridging the edges of the paper *b*. The tire may then be revolved by means of the motor 15 and the strip will thus be drawn off and applied around the entire circumference completing the package as shown in Fig. 7.

To remove the tire it is necessary only to rock the lever 101 to the dotted line position in Fig. 1, separate the rolls 25, 27 and 29 by depressing pedal 41, break the toggle 79 by means of the handle 81 (Fig. 3) and then to withdraw the package laterally from the drum.

We have described in considerable detail the particular embodiment of our invention chosen for purposes of illustration in order that the details of construction disclosed might be readily understood. It is obvious, however, that this detail is not of the essence of the invention which might be embodied mechanically in many different ways. Furthermore while we prefer the combination of mechanisms herein shown they need not necessarily be used together in all cases.

What we do claim and desire to secure by Letters Patent is:

1. A machine of the class described, comprising means to support an annular article with a strip of wrapping material within the same, means to fold outwardly said strip about the sides of the article and means to press toward each other at the outer circumference of the article the edges of said strip.

2. A machine of the class described comprising a cylindrical support for a wrapping strip, means for positioning an annular article centrally thereon and means to lift the edges of the strip from the support and fold them about the sides of the article.

3. A machine of the class described comprising a rotatable cylindrical support, strip supply means within the same and means for tensioning a strip on said support withing an encircling annular article.

4. A machine of the class described, comprising a cylindrical support adapted to receive an annular article encircling the cylindrical surface thereof, pairs of opposed arms pivoted thereto along the bases thereof and means to cause said arms to fold substantially in unison toward one another inwardly transversely of the cylindrical surface of said support.

5. A machine of the class described comprising a circular support, circumferential rows of arms, corresponding arms of the rows being pivoted for movement toward and from one another, and extensible connections between the outer ends of the arms of a row.

6. A machine of the class described comprising a circular support, circumferential rows of arms, corresponding arms of the rows being pivoted for movement toward and from one another, extensible connections between the outer ends of the arms of a row and means for operating said arms in unison.

7. A machine of the class described comprising a drum providing a cylindrical support for a tire, arms pivoted to the drum along the side of said support, said arms normally lying inwardly of the drum surface and means to rock said arms outwardly in unison.

8. A machine of the class described comprising a drum providing a cylindrical support for a tire, arms pivoted to the drum along the side of said support, said arms normally lying inwardly of the drum surface, means to rock said arms outwardly in unison and springs connecting the distal ends of said arms.

9. A machine of the class described comprising means for supporting a tire with a strip encircling a circumference thereof and means for folding the edge of the strip about the tire side toward the other circumference including a spring ring normally positioned to lie on the opposite side of the paper from the tire and movable toward said other circumference to lie along the side of the tire and press the paper thereagainst.

10. A machine of the class described comprising means for supporting a tire with a strip encircling a circumference thereof and means for folding the edge of the strip about the tire side toward the other circumference including a ring for contact with said paper and means to change the circumference thereof whereby to fold the paper over the tire side.

11. A machine of the class described comprising a support for the tire and wrapping strip, means to fold the edges of the strip over the tire sides, members having a profile corresponding to the sides of the tire and means for closing said members in against the tire.

12. A machine of the class described comprising a support for the tire and wrapping strip, means to fold the edges of the strip over the tire sides, members having a profile corresponding to the sides of the tire and means for closing said members in against the tire, said members and the tire on its support being relatively rotatable.

13. A machine of the class described, comprising a drum, strip supply means to deliver a strip from the inner side thereof to the surface thereof and means for rotating said drum and also operating said means or for rotating said drum independently.

14. A machine of the class described comprising a supporting drum, strip supply means to deliver a wrapping strip from the inner side thereof to the surface thereof, means for holding the strip folded about an annular article on said support and means for rotating said drum and also operating said means or for rotating said drum independently.

15. A machine of the class described comprising a cylindrical support, a set of positioning members about the same and means for moving said members in and out toward said support, said members in their inner position lying along a circle concentric with said support and being adapted to engage and suspend a tire by its outer circumference in spaced relation to said support whereby wrapping material can be introduced over said support and encircling the inner circumference of the tire.

16. A machine of the class described comprising a cylindrical support, members concentrically positioned about the same and means for moving said members in and out from the center, said members in their inner position lying along a circle concentric with said support and being adapted to engage and suspend a tire by its outer circumference in spaced relation to said support whereby wrapping material can be introduced over said support and encircling the inner circumference of the tire.

17. A machine of the class described comprising a cylindrical support, members concentrically positioned about and yieldingly pressed toward the same and means for moving said members outwardly against such yielding pressure, said members in their inner position lying along a circle concentric with said support and being adapted to engage and suspend a tire by its outer circumference in spaced relation to said support whereby wrapping material can be introduced over said support and encircling the inner circumference of the tire.

18. A machine of the class described comprising a drum, paper supply means adjacent said drum to permit delivery of a strip to the surface of the drum in encircling relation thereto, strip-folding mechanism for folding over the margins of the strip throughout the circumference of the drum and a sealing-strip carrier mounted opposite the drum.

19. A machine of the class described comprising a drum, paper supply means adjacent said drum to permit delivery of a strip to the surface of the drum and strip plaiting mechanism located between the supply means and the drum surface.

20. A machine of the class described comprising a cylindrical drum having a slit corresponding to an element of the cylinder, means within the drum to support a supply of strip and strip plaiting mechanism between the supporting means and the slit.

21. A machine of the class described comprising means for supporting a tire by its outer periphery, means to support a wrapping strip in encircling relation to its inner circumference and means to fold both edges of the strip up over the sides of the tire.

22. A machine of the class described comprising means to support a tire with a wrapping strip encircling its inner circumference and means to fold both edges of the strip up over the sides of the tire.

23. In a machine of the class described, a supporting drum for receiving a paper strip thereabout having a relatively narrow, expansible, ring-shaped portion 77 for clamping the tire and folding mechanism for lifting the paper from the drum to place it about the clamped tire.

In testimony whereof we have signed our names to this specification.

WILLIAM M. WHEILDON.
EDWARD H. ANGIER.