E. H. ANGIER.

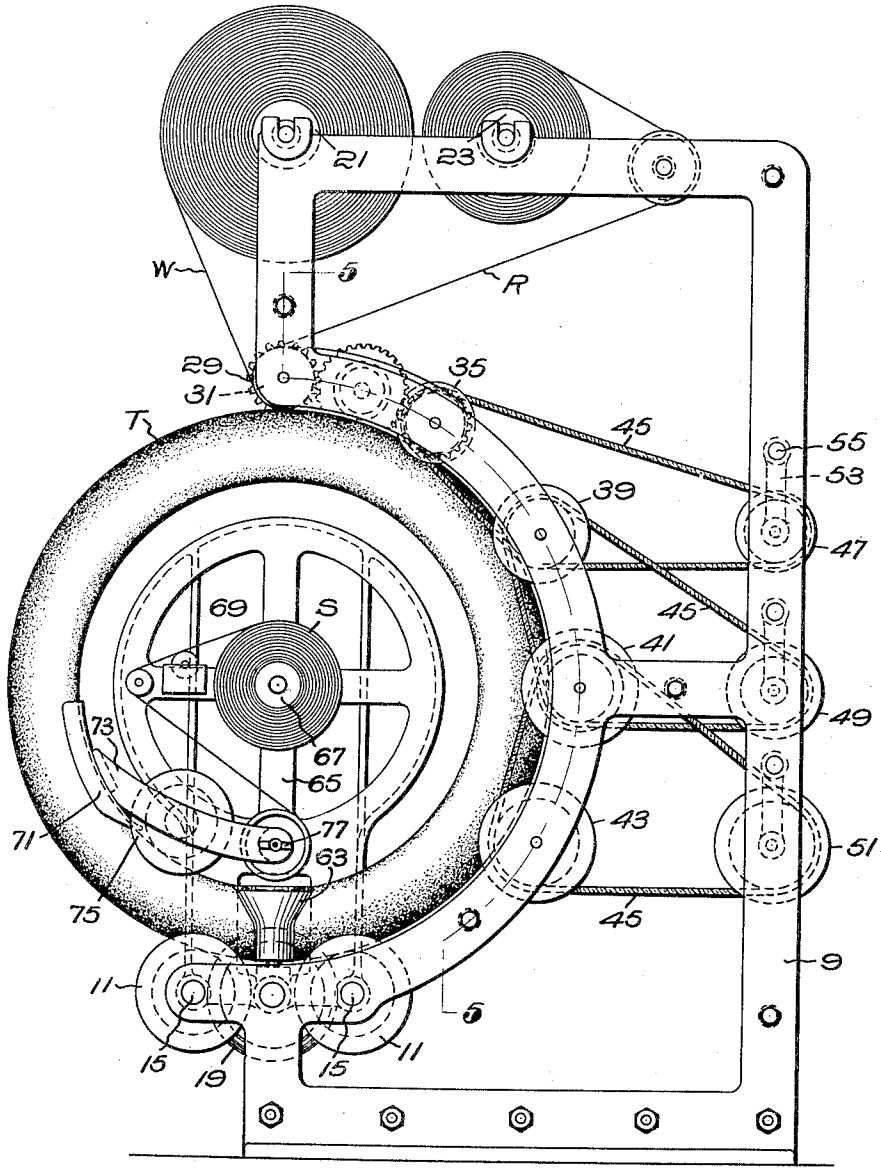
WRAPPING OR PACKAGING MACHINE.

APPLICATION FILED DEC. 31, 1917.

1,394,266. Patented Oct. 18, 1921.

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

Fig. 2.

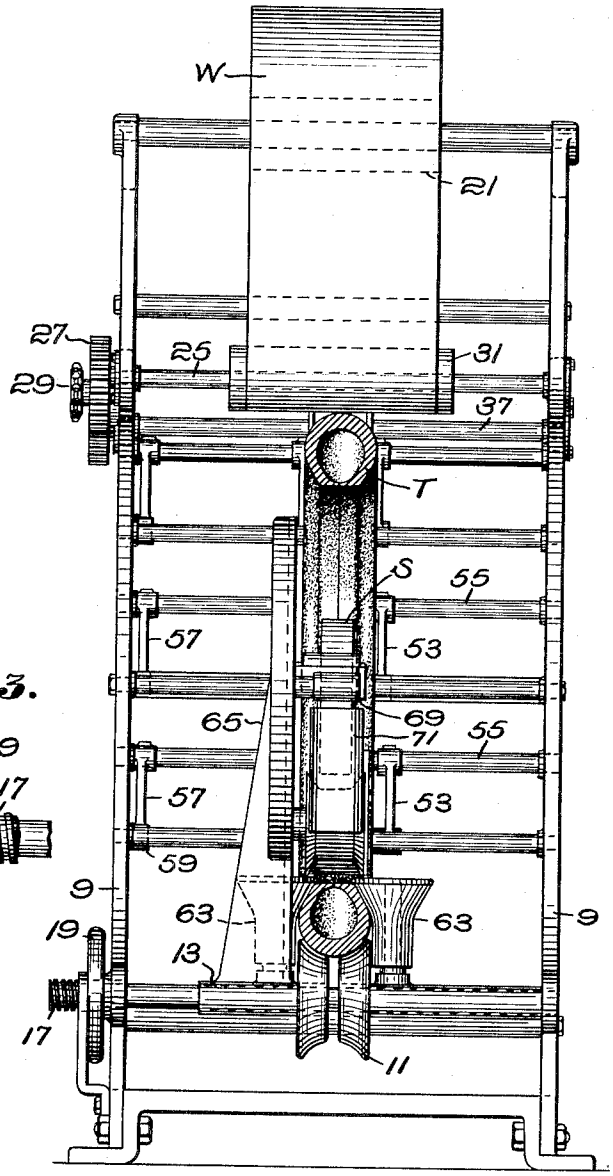


Fig. 3.

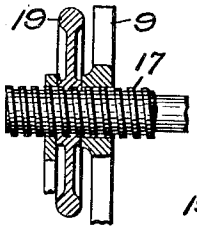
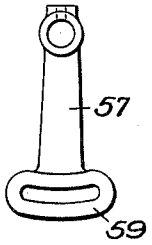


Fig. 4.



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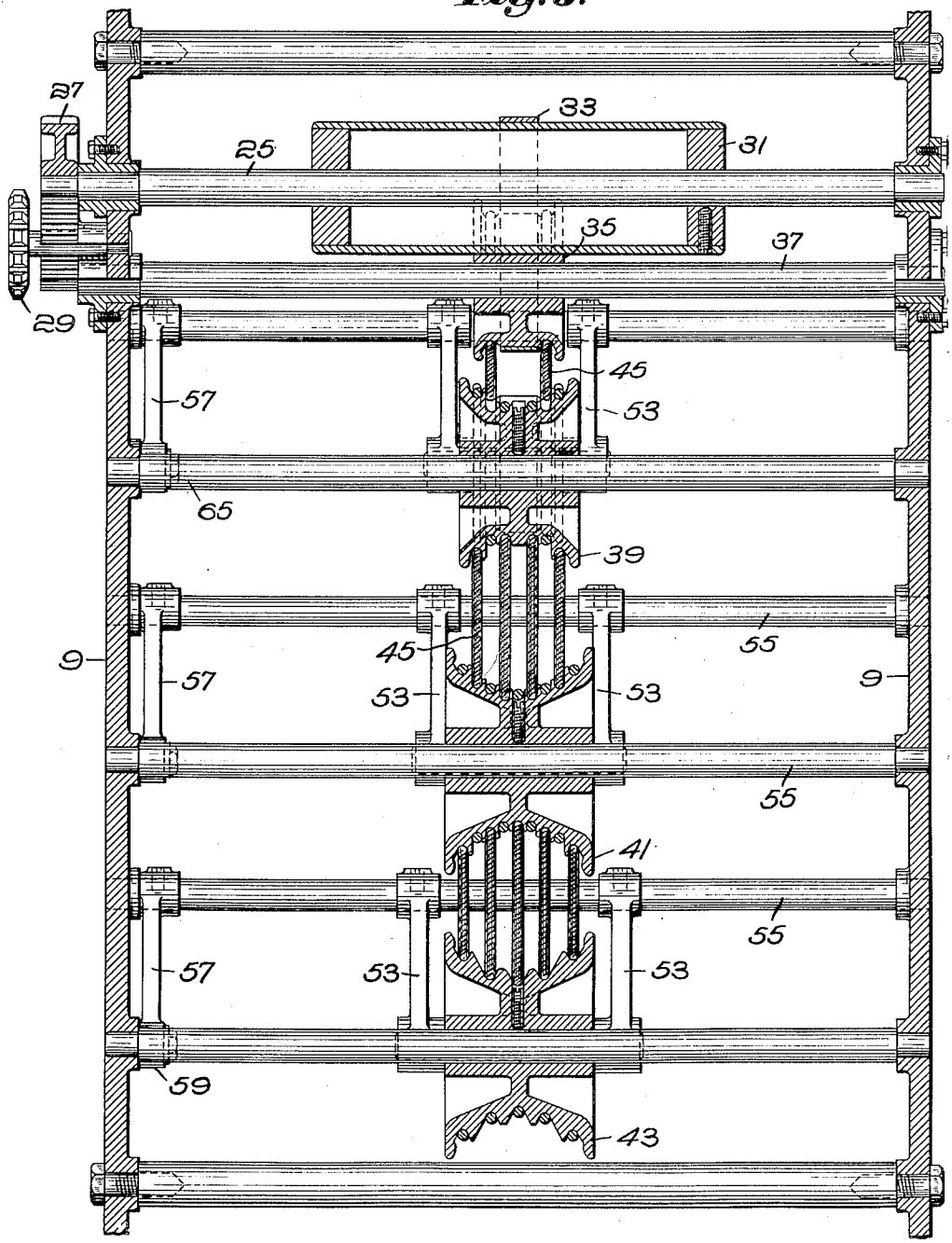
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4 SHEETS—SHEET 3

Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 6.

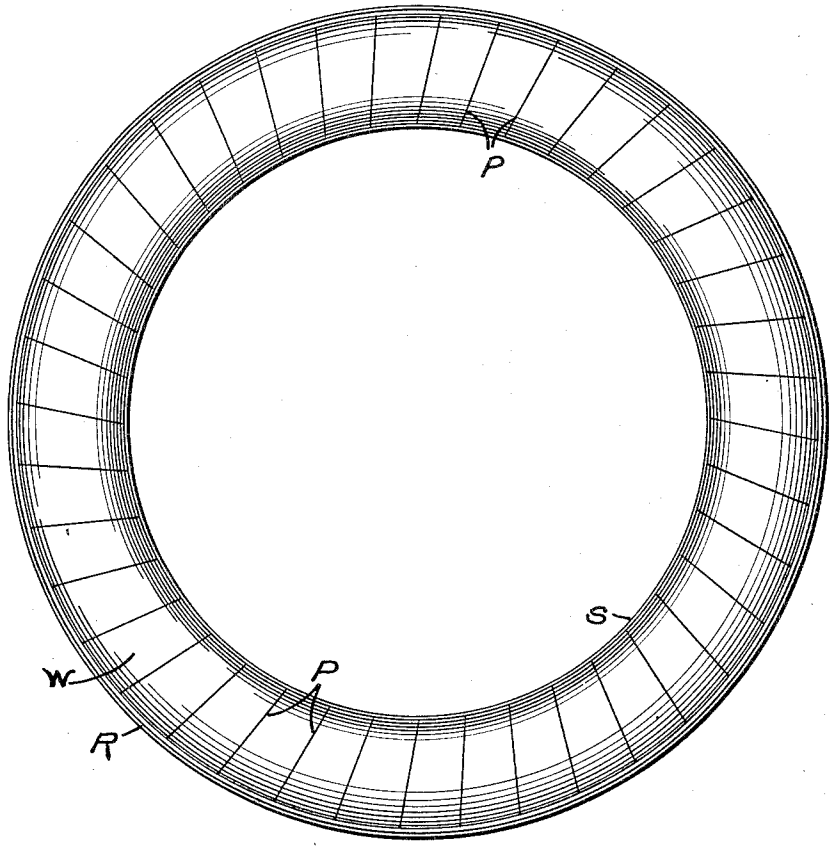
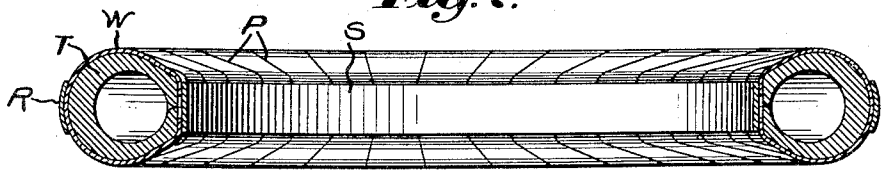


Fig. 7.



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UNITED STATES PATENT OFFICE.

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WRAPPING OR PACKAGING MACHINE.

1,394,266. Specification of Letters Patent. Patented Oct. 18, 1921.

Application filed December 31, 1917. Serial No. 209,642.

To all whom it may concern:

Be it known that I, EDWARD H. ANGIER, a citizen of the United States, and resident of Framingham, in the county of Middlesex and Commonwealth of Massachusetts, have invented an Improvement in Wrapping or Packaging Machines, 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 or packaging machines and in particular to such a machine which is adapted to inclose in a wrapping toric articles. By toric I understand articles which may be considered as generated by the revolution of a plane figure about an axis in its plane but usually external to the figure itself. An example of such an article is the casing of a pneumatic vehicle tire, in which instance the revolution is a complete one and the article is annular. I anticipate a major field of usefulness for my machine in the packaging of such tire casings and for convenience in the following description I shall refer specifically to the article wrapped as a tire, using that word in an exemplary sense.

My invention may be understood by reference to the following description of the single illustrative embodiment of a machine constructed in accordance with my invention which is shown in the accompanying drawings wherein:

Figure 1 is a side elevation of the machine with the tire in position;

Fig. 2 is a front elevation, the tire being shown in section;

Figs. 3 and 4 are details to be referred to;

Fig. 5 is a section on the line 5—5 of Fig. 1 and is on an enlarged scale;

Fig. 6 is a side elevation of a wrapped tire; and

Fig. 7 is a diametrical section thereof.

The machine herein shown is designed to provide a package such as is shown in Figs. 6 and 7 wherein the tire T is inclosed by a wrapping composed essentially of a single wrapping strip or sheet W. The strip W extends about one circumference, herein the tread, of the tire and may be reinforced centrally, as here shown, with a reinforcing strip R, and is folded inwardly over the sides of the tire and has its edges folded in and presented toward each other at the other circumference thereof. Since the inner circumference of an annular article is shorter than the outer circumference, the strip is fitted to the cross-sectional form of the tire by suitable gatherings or plaitings P of such form and extent as to form the strip W into a smooth fitting covering. Since the size of individual plaits varies at different points along the transverse circumference of the tie these plaits might aptly be called differential plaits. In the present embodiment of the invention, as seen in Fig. 7, the edges of the wrapping strip W are secured together at the inner circumference of the tire by a sealing strip S adhesively secured thereto.

To facilitate an understanding of the following description of the mechanism herein disclosed, I shall first briefly recite, without reference to the particular mechanical details shown, the manner in which the wrapping strip W is fitted about the tire in the machine here illustrated as an example of my invention.

In that particular embodiment the tire is supported so that it may be rotated and a convenient supply of wrapping strip W is provided near at hand. The wrapping strip may be applied to a circumference of the tire, herein the outer circumference, and as the tire is rotated it will be drawn from the supply into encircling relation to the tire. Means are provided which fold the edges of the strip up over the sides of the tire as it is drawn about the same and provision is also made for gathering up the fullness of the strip as it is thus applied to a shorter portion of the tire. In the present embodiment of the invention the folding mechanism and gathering mechanism are closely associated and to a certain extent the functions are common to individual elements. Preferably, as in the example shown, means are provided through which the tire is advanced as it rotates, which will spread the gathered portions over the sides of the tire in close-fitting relation thereto. The edges of the strip are folded in at the inner circumference and the sealing strip S is applied. A characteristic feature of the machine here disclosed is that the wrapping

is applied progressively about the circumference of the tire, the differential plaiting and also the sealing of the wrapping strip taking place progressively while the strip is being drawn into position.

Referring now to the mechanical details of the machine here shown, I have disclosed in Figs. 1 and 2 a machine having two side frames 9. Adjacent the lower portion of the frames are supporting means for the tire comprising pairs of rolls 11, the elements of each pair of which are oppositely concave, as seen in Fig. 2, so that each pair in effect forms a single concave roll in the hollow of which the tire rests. Herein the left hand elements of each pair, viewing Fig. 2, are carried by a carriage 13 slidable on the common journals 15 (Fig. 1) for the rolls 11. Associated with the frame is a screw shaft 17 (Figs. 2 and 3) with which coöperates a nut 19, in the present example in the form of a hand wheel. When the nut is rotated, the carriage with the left hand rolls 11 can be drawn to the left, facilitating the insertion of the tire in the machine as will more fully appear hereinafter.

Referring to Fig. 1, a spool 21 is provided at the top of the frame adapted to support a roll of wrapping strip W, so that it may be led therefrom to the surface of the tire T, supported on the rolls 11, and be drawn about the same as the latter rotates. Another spool 23 may be provided for the reinforcing tread strip R, if such a strip is to be used.

In the present embodiment of the invention the tire, when supported on the rolls 11, is brought into contact with a number of driving and folding devices which are adapted to rotate the same and also to draw the strip W off the spool 21 about the circumference of the tire and to fold it over the sides thereof. As seen in Fig. 1, the side frames 9 are provided with arc-shaped parts corresponding to the curve of the tire and providing journal bearings for transverse shafts on which various rolls are mounted. For convenience I shall describe in detail the particular number and arrangement of rolls here shown, taking them in order as they act upon the strip W and in so doing will refer more particularly to Fig. 5, although the reader should refer to Figs. 1 and 2 to facilitate his understanding of the mechanism. Mounted directly beneath the spool 21 and at the uppermost point of the tire is the driven shaft 25 adapted to take motion through the gearing 27 from the shaft of a driving sprocket 29 connected with any suitable source of power, not shown. On the shaft 25 is mounted a drum or roll 31 adapted to contact with the tread of the tire. A belt 33 connects the drum 31 with a concave roll 35 mounted on a transverse shaft 37 which in the present instance is also driven from the sprocket 29. Spaced at various points along the arc-shaped portions of the frame and therefore at different points about the circumference of the tire T, are a series of concave rolls 39, 41 and 43. Each of these rolls is of a somewhat greater width than the one preceding it and laps farther over the sides of the tire. In other words the rolls, which make contact with the sides of the tire, are gradually adapted to the form thereof. Herein the various rolls are secured together by rope belts 45, two of these belts being shown between the rolls 35 and 39, four between 39 and 41 and five between 41 and 43, the belts of the various sets being mounted in staggered relation, as shown in Fig. 5. Each set of these belts, being mounted along the surface of a concave roll, forms a sort of trough and the successive troughs are deeper and more curved in form and more closely approximate the cross-sectional form of the tire.

In the present embodiment of the invention, as seen best in Fig. 1, each set of belts also passes about a third roll of which three are marked 47, 49 and 51 in that figure. In Fig. 5 the rolls 47, 49 and 51 are concealed behind the rolls 39, 41 and 43 respectively, but from that figure it can be best seen that the journal of each roll, shown dotted in that figure, is mounted on a pair of crank arms 53 extending from shafts 55 rotatably supported in the side frames 9. Secured to each of these shafts is a crank arm or lever 57 (shown in detail in Fig. 4) having an outer slotted end 59 in which is adapted to fit a bolt 61 entering the side frame. The shafts 55 may be rocked by means of these levers and secured in adjusted position by setting up the bolt 61 in its slot. This adjustment will swing the several rolls 47, 49 and 51 and tighten the various rope belts which pass over them.

Reviewing the operation of the mechanism so far described, it will be seen that if the tire is placed in position against the various rolls and the end of the wrapping strip W pulled down from the spool 21 and inserted beneath the roll 31 and power applied through the sprocket 29, the tire T will be rotated in a clockwise direction, viewing Fig. 1, and that the wrapping strip will be drawn about the same and will be pressed between the tire and the various rolls. As the tire advances the rolls fit closer and closer thereto and the strip is necessarily folded inwardly over the sides of the same. This action is effected in part by the rolls and in part by the troughs formed by the sets of belts. Furthermore, it will be understood that the driving speed of the tire is effected primarily by the roll 31 and the flat belt 33. The linear speed of the section of the tire remote from the tread is, however, less than the linear speed of the

exterior tread by which the tire is driven. The linear speed of the lateral elements of each set of represented belts 45 is, however, greater than the center ones adjacent the tire tread. This is because the parts of the concave rolls with which they are associated are of greater radius than the central parts. The lateral belts therefore move at a considerably greater linear speed than the adjacent portion of the tire and wrapping strip W and they therefore serve to gather up the fullness of the latter.

In the present instance the tire with the strip partially folded about it is advanced through a mechanism approximating the section of the tire, which mechanism completes the folding of the wrapping strip, smoothes out the gathered portions thereof and fits them snugly to the tire sides. Herein, (see Figs. 1 and 2), this mechanism takes the form of two rolls 63, one at either side of the tire. As seen in Fig. 2, the upper portion of each roll is of inverted conical form adapted to extend in over the sides or flanks of the tire, and in coöperation the two rolls approximate the section of the tire itself. One of the rolls, herein the left hand one in Fig. 2, is mounted on the slidable carriage 13 hereinbefore referred to, so that it may readily be drawn to one side to permit insertion of the tire. Obviously it would be impossible to get the tire in position between the two rolls so closely approximating its form were one not movable. As the tire is advanced by the various driven rolls before referred to, the rolls 63 rotate idly over the sides thereof, fitting the wrapping strip smoothly thereto and ironing out the gathers made by the rolls 39, 41 and 43 and the various belts 45.

As already stated, the present embodiment of the invention contemplates turning in the edges of the strip at the inner circumference of the tire and joining them by a sealing strip S. Herein a standard 65 rising from the movable carriage 13 supports a spool 67 adapted to hold a supply of the strip S and, as seen in Fig. 2, when the tire is in position and the carriage 13 moved to the right to bring the rolls 11 and 63 into operative position, the spool 67 with its roll of paper is thrust inwardly substantially to the central plane of the tire and is suspended within the central opening thereof. The strip S which is a gummed strip may be led over a moistening device 69, shown diagrammatically in the figures, mounted on the standard 65, and thence beneath a presser 71 supported by an arm 73 pivoted to the standard. The presser corresponds in form to the section of the tire at its inner circumference (see Fig. 2) and may have a portion 75 turned up at the right hand end, viewing Fig. 1, as shown in that figure, in the manner of the well known hem turners which are used on sewing machines or like the mold board of a plow. This portion 75 in coöperation with the upper portions of the rolls 63 serves to fold in the edge portions of the strip W at the inner circumference of the tire and the sealing strip S has its gummed face pressed down against these edge portions by the weight of the member 71 and its supporting arm 73. The length of the member 71 may be such as to insure the strip being securely gummed down to the edges of the strip W. When it is desired to remove the tire the arm 73 may be swung upwardly and fixed in position by the thumb nut 77.

Reviewing briefly the operation of the machine, it will be seen that when the tire is placed in position and the mechanism started, the strip W is first drawn from its spool to be applied to the tire. While this is still going on, a certain part of the strip which has already been led along the outer circumference of the tire is being folded over the same by the various rolls and their coöperating belts and the fullness thereof is being gathered up. As the work proceeds and while these operations are still in progress the part of the tire first acted upon is advanced through the folding mechanism represented by the rolls 63 and the strip is pressed down smoothly about the tire. At a still further point the sealing strip S is applied. All these operations take place progressively at various points about the circumference of the tire and the action of the machine is thus very rapid. Of course when sufficient wrapping strip has been drawn off to completely package the tire, and I anticipate that ordinarily but one thickness or convolution of such strip would be used, the strip W is severed while the rotation of the tire continues until the end of the strip has passed the sealing mechanism represented by the presser 71, or, if desired, the tire may be rotated again several times in order to thoroughly smooth out the parts and insure complete adherence at the sealed joint.

I have described in detail the particular embodiment of my invention here shown in order that it might be well understood. It will be understood, however, that the mechanisms illustrated are merely examples of those which might be used and though desirable are not necessary to carry out the principles of my invention.

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

1. A machine for wrapping toric articles comprising means for gathering the fullness of a sheet of wrapping material to shape it about the sides of the article and a folding mechanism approximating the form of the article through which the article and said sheet are advanced to smooth the gatherings about the article.

2. A machine for wrapping toric articles comprising a series of concaved rolls disposed about a circle and adapted to receive the article and means for driving said rolls to rotate the article whereby to draw wrapping material circumferentially thereabout and fold the same transversely thereover.

3. A machine for wrapping toric articles comprising means for drawing paper about a curved dimension of the article and means acting progressively with said drawing action to fold the paper over the article transversely of said dimension.

4. A machine for wrapping toric articles comprising means for drawing paper about a curved dimension of the article and means to fold the same over the article transversely of said curved dimension as it is applied along said dimension.

5. A machine for wrapping toric articles comprising means to rotate the article whereby to draw paper around the same and a series of folding devices in the path of its rotation successively approximating more closely to the transverse form of the article.

6. A machine for wrapping a toric article comprising driven elements engaging a circumference thereof, associated parts adjacent the sides thereof driven at a different speed whereby to gather the fullness of wrapping material over the article and a folding device approximating the section of the article to receive and fold said gathered portions.

7. A machine for wrapping an annulus comprising a set of driven members distributed to engage the annulus along an arc of its major circumference and also at different points along its transverse circumference, said members having differential speeds relative to the annulus whereby to shape wrapping material about the same.

8. A machine for wrapping a toric article comprising driven elements engaging a circumference thereof and associated parts adjacent the sides thereof driven at a different speed whereby to shape wrapping material over the article.

9. A machine for wrapping an annulus comprising a member to engage a circumference of the annulus and members to engage the sides of the annulus relatively movable to the first in a general circumferential direction whereby to shape to the form of the article wrapping material which extends over the annulus transversely.

10. The method of packaging an annulus characterized by encircling a circumference of the same with a wrapping strip and gradually as the encircling proceeds fitting the same to the transverse form of the annulus by differential plaiting.

11. A machine for wrapping a toric article comprising means for supporting the article, means to support a supply of paper strip in position to be led to a circumference of the article and means receiving the strip as drawn from the supply acting to gather the strip edges into differential plaits.

12. A machine for wrapping a toric article comprising means for supporting the article, means to support a supply of paper strip in position to be led to a circumference of the article, means for gathering the strip as it is drawn from the supply and means to spread the gathered portions over the sides of the article in fitted relation thereto progressively as the strip is applied to the article.

13. A machine of the class described comprising strip supply means 21, gathering means 45 and fitting means 63.

14. A machine for wrapping an annular article comprising means to draw paper about a circumference thereof, means acting to fold the paper over the sides of the article and inwardly at the other circumference as it is drawn about the first and means for joining the paper at said other circumference as it is folded.

15. A machine for wrapping an annular article comprising means to support the article with a wrapping strip applied to the circumference thereof, means to gather the fullness of the strip over the sides of the article along an arc thereof to approximate the form of the article and a folding means approximating the section of the article through which the article and the gathered strip are advanced to smooth the latter.

16. A machine for wrapping a toric article comprising means to suspend the article by engagement with its outer circumference, means for applying a wrapping thereabout with opposed edges at the inner circumference, a sealing strip supply and a presser therefor located within the opening of the annulus.

17. A machine for wrapping a toric article comprising means to suspend the article rotatably by engagement with its outer circumference, means for applying a wrapping thereabout with opposed edges at the inner circumference, sealing strip supply means supported in the opening of the annulus and a presser similarly supported and adapted to bear on the inner circumference thereof in the rotation thereof.

18. In a machine for wrapping toric articles, a series of rolls disposed about an arc peripherally to engage the article, a flat band belt between the first two rolls, and belts in progressively increasing numbers between the following successive pairs, the latter rolls being concaved to adapt each set of belts to the section of the article.

19. In a machine for wrapping toric articles, a series of concaved rolls disposed about

an arc peripherally to engage the article, and belts in progressively increasing numbers between successive pairs of the rolls.

20. In a machine for wrapping annular articles, in combination with means for peripherally engaging an article along a portion of its circumference, folding devices 63 for engaging the article on either side and together approximating the cross-sectional form of the article, said devices being relatively movable to permit the introduction of the article.

21. In a machine for wrapping annular articles, in combination with means for peripherally engaging an article along a portion of its circumference, folding devices 63 for engaging the article on either side and together approximating the cross-sectional form of the article, and a strip supply support arranged to lie within the annulus when it held by said devices, one thereof being movable to permit the introduction of the article.

22. In a machine for wrapping annular articles, in combination with means for peripherally engaging an article along a portion of its circumference, a folding device adapted to engage one side of the article and approximating the cross-sectional form thereof, a shiftable frame carrying an opposed similar device and also a strip supply support adapted to lie within the annulus when said devices are in engagement therewith.

In testimony whereof I have signed my name to this specification.

EDWARD H. ANGIER.