March 23, 1937. J. DERRY 2,074,892

WRAPPING MACHINE

Filed Oct. 29, 1936 3 Sheets-Sheet 1

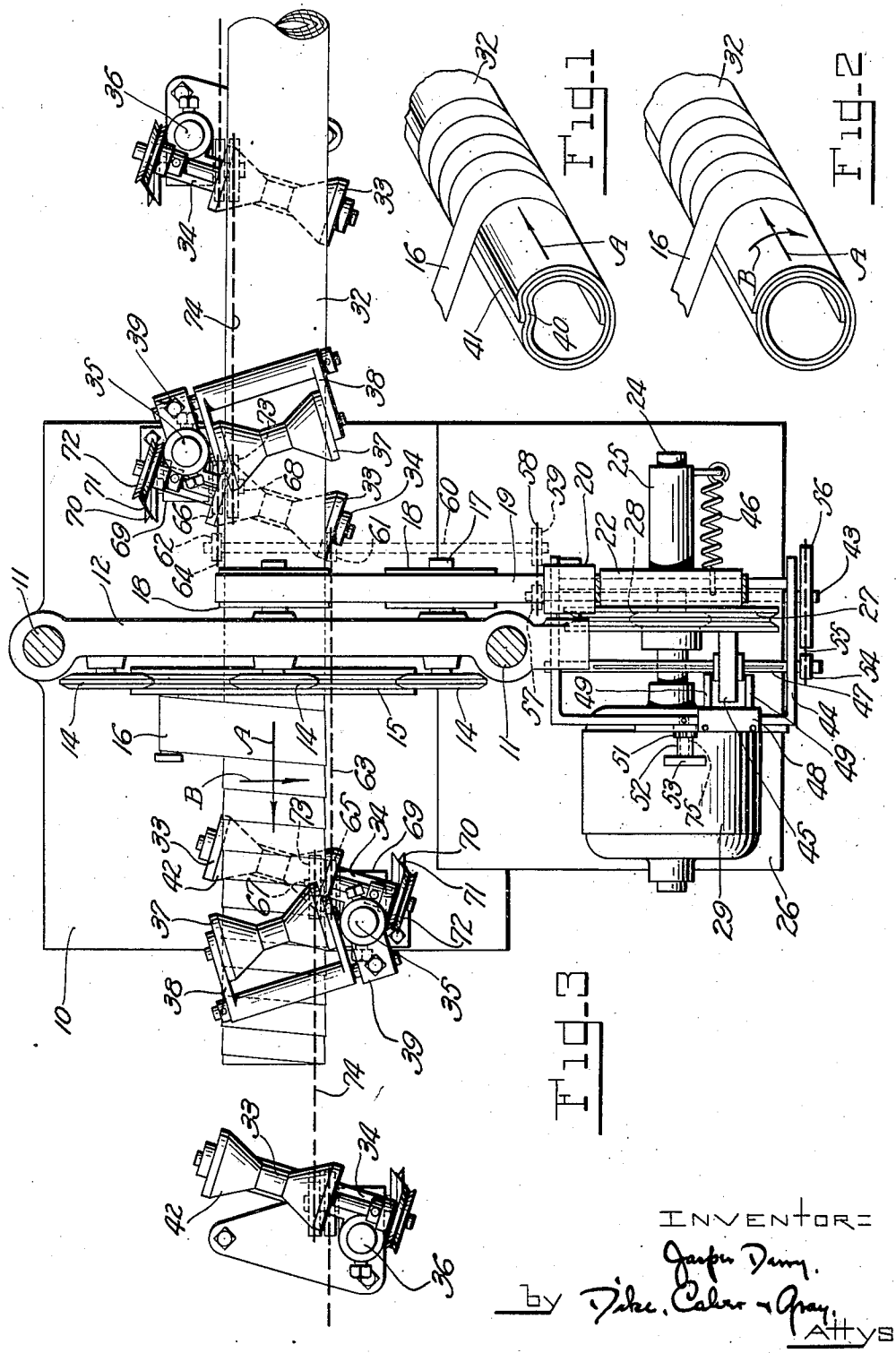


Fig. 3

Fig. 1

Fig. 2

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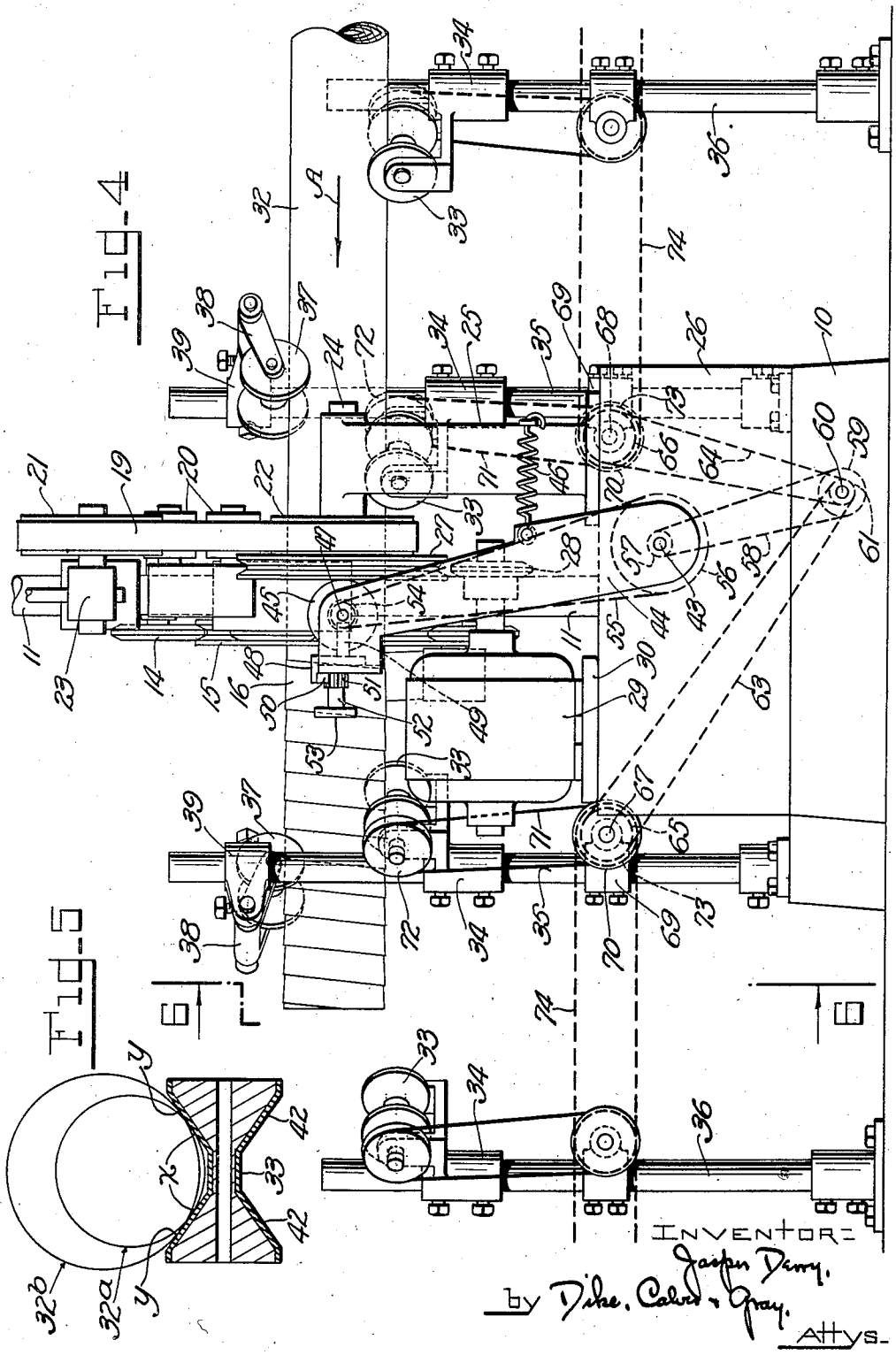


Fig-4

Fig-5

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WRAPPING MACHINE

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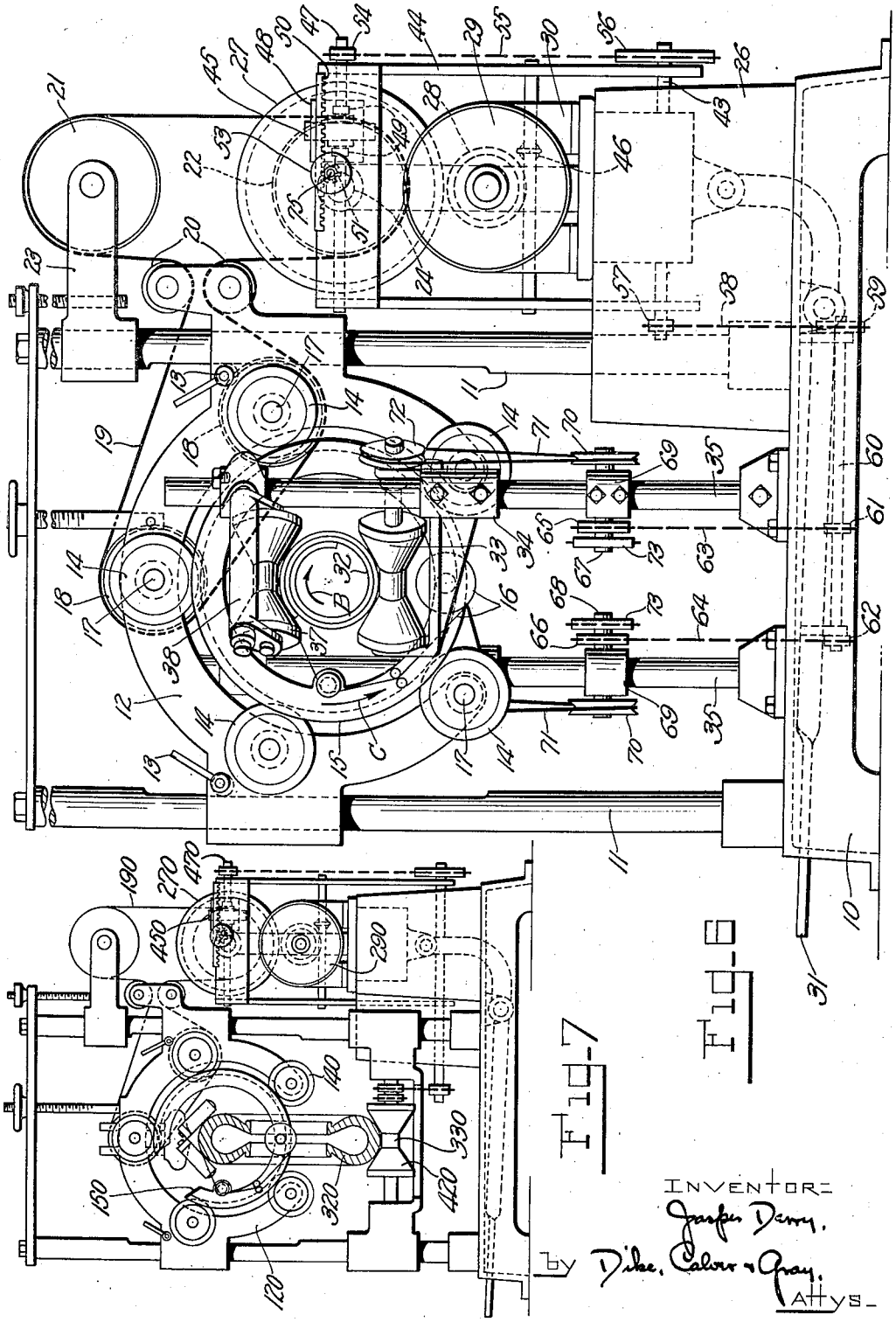


Fig-7

Fig-8

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Patented Mar. 23, 1937

2,074,892

UNITED STATES PATENT OFFICE

2,074,892

WRAPPING MACHINE

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Application October 29, 1936, Serial No. 108,187

9 Claims. (Cl. 93—2)

This invention relates to machines for applying helical windings of a strip of wrapping material to an article to be wrapped, and especially, although not exclusively, to machines for so wrapping cylindrical objects, such as rolled rugs, carpets, and similar sheet material.

A type of machine heretofore employed for the latter purpose comprises a rotary annular shuttle provided with means for applying a wrapping strip under tension to a roll of material passed therethrough, together with means for feeding the roll axially through the shuttle, whereby the wrapping strip is applied in the form of helical convolutions or windings about said roll. In the operation of such machines, wherein the rolled rug or the like is given only an axial or longitudinal movement as it is passed or fed through the shuttle, it has been found that the action of applying the wrapping strip, under the necessary tension, tends to cause longitudinal wrinkles or folds to be formed in the windings or convolutions of the rolled rug, especially along or adjacent the line where the overlapping outer edge of the rug makes contact with the contiguous winding or convolution, which wrinkles or folds, if the rug remains wrapped for a considerable time, are subsequently difficult to smooth out. The present invention has for an object to provide a wrapping machine for rolled rugs or the like wherein the formation of such folds or wrinkles is avoided.

Another object of the invention is to provide a wrapping machine for applying helical wrappings or windings wherein the amount of overlap of the contiguous windings or portions of the wrapping strip may be readily controlled in accordance with the requirements, and particularly in accordance with the size of the article wrapped.

The foregoing and other objects of the invention, together with means whereby the latter may be carried into effect, will best be understood from the following description of certain illustrative embodiments thereof shown in the accompanying drawings, these, however, having been chosen for purposes of exemplification merely, as it will be obvious to those skilled in the art that said invention, as defined by the claims hereunto appended, may be otherwise embodied without departure from its spirit and scope.

In said drawings:

Fig. 1 is a fragmentary perspective view illustrating the effect of helically wrapping a rolled rug or the like by means of machines heretofore employed for this purpose.

Fig. 2 is a similar view illustrating the effect of a similar operation by means of a machine operating in accordance with the present invention.

Fig. 3 is a plan view, partly in section, of a machine embodying the invention.

Fig. 4 is a side elevation thereof.

Fig. 5 is a detail sectional view of one of the feed rolls, illustrating the coaction thereof with cylindrical or similar objects of different sizes.

Fig. 6 is an end elevation of the machine as viewed from the line 6—6, Fig. 4.

Fig. 7 is an elevation, partly in section, of another type of machine embodying one feature of the invention.

The frame of the machine comprises a base 10 from which rise uprights 11 supporting between them a yoke or shuttle race 12 secured to said uprights by clamps 13 which permit its vertical position to be adjusted. The yoke 12 is provided with a series of guide rollers 14 for an annular shuttle 15 which carries a supply of wrapping material in the form of a continuous strip 16. In order to rotate the shuttle 15 in the yoke 12, the shafts 17 of one or more of the rollers 14 are provided with pulleys 18 to receive a belt 19 which, in addition to passing about said pulleys, passes between a pair of guide pulleys 20 carried by the yoke 12, over a third guide pulley 21, and about a driving pulley 22. The guide pulley 21 is carried by an arm 23 adjustably mounted on one of the uprights 11, whereby the tension of the belt 19 may be properly maintained when the vertical position of the yoke is adjusted. The driving pulley 22 is secured to a shaft 24 journalled in an upright 25 rising from an elevated portion 26 of the machine base. Also secured to the shaft 24 is a driving disk 27 adapted to be driven by frictional engagement with a friction wheel 28 on the shaft of an electric or other motor 29. Said motor is carried by a frame 30 which normally rests by gravity on the top of the base portion 26, but which can be lifted, by means of a treadle 31, to engage the friction wheel 28 with the driving disk 27.

The rolled rug 32 or other cylindrical object to be wrapped is supported and passed axially through the shuttle 15 by a series of combined supporting and feed rolls 33 rotated in unison by mechanism hereinafter described, whereby, as the object 32 progresses axially through the shuttle, the rotation of the latter causes the wrapping strip 16 to be wound helically about said object. The feed rolls 33 are carried by shafts journalled in brackets 34 adjustably secured to uprights 35 and 36, the former of which

rise from the machine base 10, and the latter of which may be supported on the floor adjacent thereto. By raising or lowering the brackets 34, rolled rugs or similar objects of different diameters can be properly centered with respect to the shuttle, or the same result can be accomplished by adjusting the vertical position of the yoke 12. The object or roll 32 may, if desired, be held in firm engagement with the feed rolls 33 by hold-down rolls 37 carried by yokes 38 pivoted to brackets 39 adjustably secured to the uprights 35 in the same manner as the brackets 34.

Except as hereinafter pointed out, or as they enter into combination with parts hereinafter described, the parts above referred to constitute no portion of the present invention and may be of any suitable construction and arrangement familiar to those skilled in the art. Machines of this general type, however, as heretofore constructed and arranged have operated to move the object 32 in the direction of its axis only, as indicated by the arrows A on Figs. 1 to 4. It has been found that, in the operation of such machines for the purpose of wrapping a rolled rug or the like, the action of the shuttle in applying the helically wound strip 16 tends to cause wrinkles or folds to be formed in the convolutions of the rug, as indicated at 40 in Fig. 1, particularly along or adjacent the line of the free edge 41 of the rug. In accordance with the present invention, this objectionable incident to the operation of prior machines is avoided by imparting to the roll of material, in addition to its axial movement, a rotation about its axis in the direction to tighten its windings or convolutions, as indicated by the arrows B in Figs. 2, 3, and 6, and preferably opposite to the direction of rotation of the shuttle, as indicated by the arrow C in Fig. 6.

To this end the combined supporting and feed rolls 33 are disposed with their axes inclined to the axis of the roll 32 and are formed with oppositely disposed, generally conical (i. e., frusto-conical, conoidal or spheroidal) end portions 42 upon which the roll 32 rests, the points of contact of the roll 32 with the end portions 42 of each of the rolls 33 being at opposite sides of the vertical plane through the axis of the roll 32 and also at opposite sides of the vertical plane through the axis of the roll 33. Consequently, as the rolls 33 are rotated to advance the roll 32 through the machine in an axial direction, the latter will also be rotated in the manner above described.

The rolls 37 are similar in form to the rolls 33, and the angularity of the axes of all of said rolls with respect to the axis of the object 32 is determined by the angular adjustment of the brackets 34 and 39 on their respective uprights.

The points of engagement of the cylindrical object 32 with the end portions 42 of the feed rolls 33 depend upon the diameter of said object. Thus, as shown in Fig. 5, an object 32*a* of relatively small diameter will engage said end portions at points *x* which are closer to the axis of rotation of the roll 33 than the points of engagement *y* of an object 32*b* of larger diameter. Consequently, for a given speed of rotation of the rolls 33, the rate of longitudinal or axial movement imparted to an object 32*b* of relatively large diameter will be more rapid than that imparted to an object 32*a* of relatively small diameter. The pitch of the helical winding, and consequently the overlap of the successive convolutions of the winding, is determined by the speed of longitudinal travel of the object relative to the speed of rotation of the shuttle, so that, if the shuttle and feed rolls be rotated at the same relative speeds in each case, the pitch of the helical windings will be greater, and their overlap less, in the case of an object of relatively large diameter than in the case of an object of relatively small diameter, which is just the opposite of what is usually necessary or desirable. In order to overcome this difficulty the present invention contemplates the provision of variable speed driving mechanism for the shuttle and feed rolls whereby they may be rotated at variable relative speeds.

Journalled in the raised portion 26 of the base of the machine is a shaft 43 upon which is pivoted a yoke 44 carrying at its free end a friction wheel 45 held in driving engagement with the face of the driving disk 27 by a spring 46 connecting the yoke 44 with the upright 25. The friction wheel 45 is splined to a shaft 47 journalled in the yoke, so as to rotate therewith but to be movable longitudinally thereon. By moving said friction wheel longitudinally of said shaft it may be caused to engage the face of the driving disk 27 at a variable distance from the axis of rotation of the latter, whereby the shaft 47 will be rotated at different speeds with respect to the speed of rotation of said disk.

For the purpose of adjusting the friction wheel 45 longitudinally of the shaft 47 there is provided a slide 48 guided on the top or head of the yoke 44 for movement in a direction parallel to said shaft and provided with arms 49 embracing the hub of the wheel 45. The slide 48 is formed with a rack 50 engaged by a pinion 51 on a sleeve 52 rotatably mounted on a stud 75 projecting from the head of the yoke 44, said sleeve being provided with an operating handle 53 whereby the pinion may readily be turned to move the slide 48 and friction wheel 45 and thereby vary the speed of the drive of the shaft 47 with respect to the speed of rotation of the shuttle.

The shaft 47 has fast thereon a sprocket 54 connected by a chain 55 with a sprocket 56 fast on the shaft 43, so that the latter shaft is driven at a speed proportional to the speed of the shaft 47. Secured to the shaft 43 is a second sprocket 57 connected by a chain 58 with a sprocket 59 fast on a shaft 60 journalled in the base 10 of the machine. Secured to the shaft 60 are sprockets 61 and 62 connected by chains 63 and 64 with sprockets 65 and 66 on shafts 67 and 68 journalled in brackets 69 adjustably secured to the adjacent uprights 35. Each of the shafts 67 and 68 is provided with a pulley 70 connected by a belt 71 with a pulley 72 on the shaft of the corresponding feed roll 33. Each of the shafts 67 and 68 is also provided with a second sprocket 73 connected by a chain 74 with similar driving mechanism on the next adjacent upright 36, these driving connections being multiplied so far as necessary in accordance with the number of feed rolls employed, as will be clear without further description in detail.

The provision above described for varying the relative speed of rotation of the shuttle and the conical ended work supporting and feeding rolls is not limited in its utility to machines such as that above described for wrapping cylindrical objects, but is also applicable to machines for wrapping annular objects, such as tires, coils of wire, etc. Thus, in Fig. 7 is shown a tire wrapping machine having a shuttle 150 supported in a yoke 120 by rollers 140 two of which are driven by a

belt 190 from a driving disk 270 which in turn is rotated by an electric motor 290, the arrangement being substantially identical with that in the machine first described. In this machine a tire 320 or other annular object to be wrapped is supported and rotated, i. e., passed through the shuttle, by feed rolls 330 having conical ends 420 and driven through suitable connections from a shaft 470 having splined thereon a friction wheel 450 adapted to engage the face of the driving disk 270 at varying distances from the center of the latter. Except for such mechanical rearrangements as are required by the type of machine, this mechanism is substantially the same as that shown in Figs. 3, 4, and 6 and will be understood without description in detail.

I claim:

1. A wrapping machine having a rotary annular shuttle provided with means for applying a wrapping strip to an article passed therethrough, means for rotating said shuttle, and mechanism for feeding a cylindrical object axially through said shuttle and simultaneously rotating the same about its axis.

2. A machine for wrapping rolled sheet material, said machine having a rotary annular shuttle provided with means for applying a wrapping strip to a roll of such material passed therethrough, means for rotating said shuttle, and mechanism for feeding said roll axially through said shuttle and simultaneously rotating the same about its axis.

3. A wrapping machine having a rotary annular shuttle provided with means for applying a wrapping strip to an article passed therethrough, means for rotating said shuttle, and mechanism for feeding a cylindrical object axially through said shuttle and simultaneously rotating the same about its axis, said mechanism comprising a series of feed rolls having oppositely disposed, generally conical end portions, said rolls being disposed with their axes inclined to the axis of said object, and means for rotating said rolls.

4. A wrapping machine having a rotary annular shuttle provided with means for applying a wrapping strip to an article passed therethrough, rolls for supporting an article to be wrapped and passing the same through said shuttle, said rolls having oppositely disposed, generally conical end portions upon which said article rests, and mechanism for rotating said rolls and shuttle at variable relative speeds.

5. A wrapping machine having a rotary annular shuttle provided with means for applying a wrapping strip to an article passed therethrough, rolls for supporting an article to be wrapped and passing the same through said shuttle, said rolls having oppositely disposed, generally conical end portions upon which said article rests, means for rotating said shuttle, and variable speed driving means for rotating said rolls from said shuttle rotating means.

6. A machine for wrapping rolled sheet material, said machine having a rotary annular shuttle provided with means for applying a wrapping strip to a roll of such material passed therethrough, feed rolls for supporting said roll of material and passing the same through said shuttle, said feed rolls having oppositely disposed, generally conical end portions and being disposed with their axes inclined to the axis of said roll of material, and mechanism for rotating said feed rolls and shuttle at variable relative speeds.

7. A machine for wrapping rolled sheet material, said machine having a rotary annular shuttle provided with means for applying a wrapping strip to a roll of such material passed therethrough, feed rolls for supporting said roll of material and passing the same through said shuttle, said feed rolls having oppositely disposed, generally conical end portions and being disposed with their axes inclined to the axis of said roll of material, means for rotating said shuttle, and variable speed driving means for rotating said feed rolls from said shuttle rotating means.

8. A machine for wrapping rolled sheet material, said machine having a rotary annular shuttle provided with means for applying a wrapping strip to a roll of such material passed therethrough, mechanism for feeding said roll axially through said shuttle and simultaneously rotating the same about its axis in a direction to tighten its windings or convolutions, and means for rotating said shuttle.

9. A machine for wrapping rolled sheet material, said machine having a rotary annular shuttle provided with means for applying a wrapping strip to a roll of such material passed therethrough, mechanism for feeding said roll axially through said shuttle and simultaneously rotating the same about its axis, and means for rotating said shuttle in a direction opposite to the direction of rotation of said roll of material.

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