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FESTOONING RACK

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2 Sheets-Sheet 1

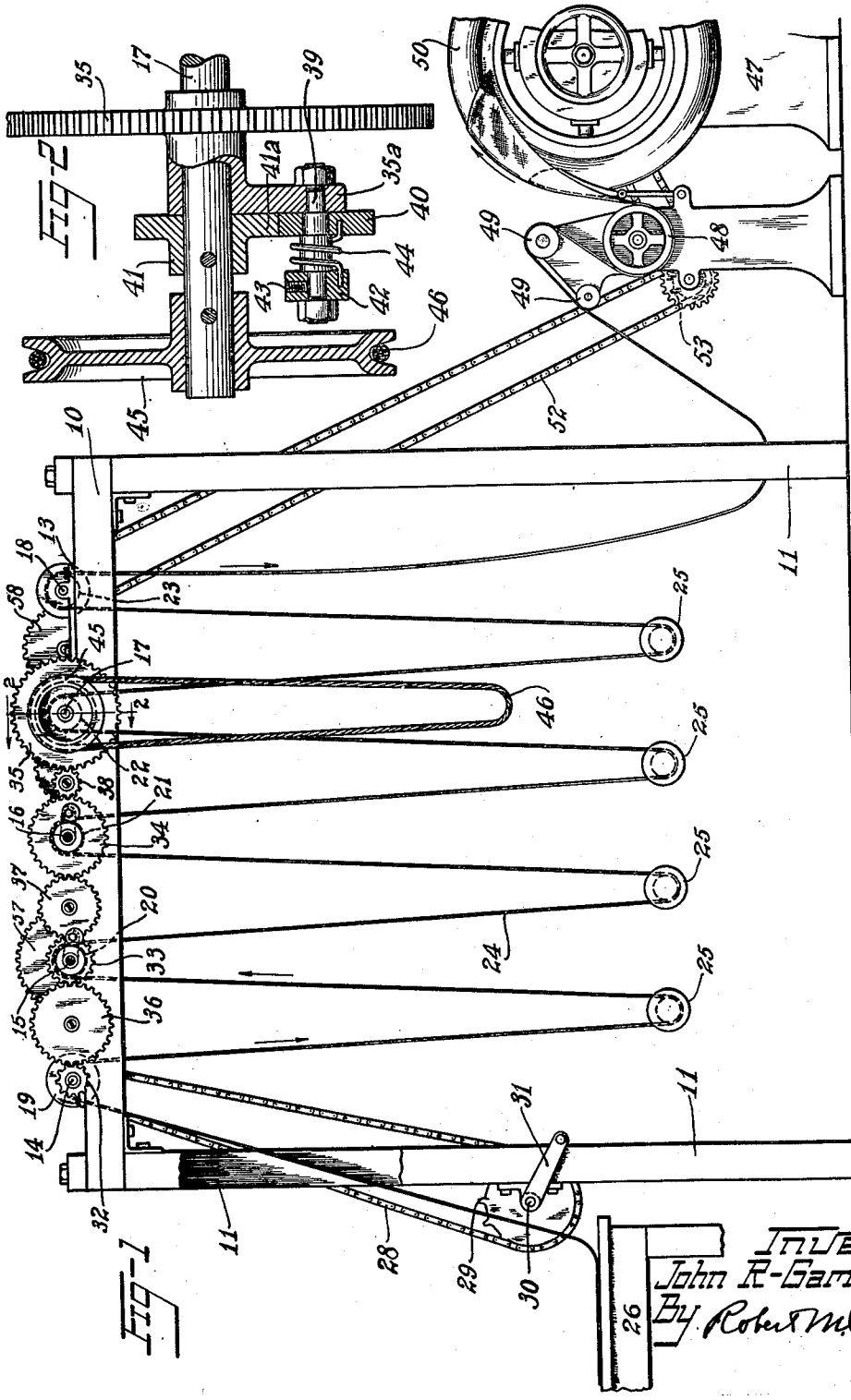


Fig-2

Fig-1

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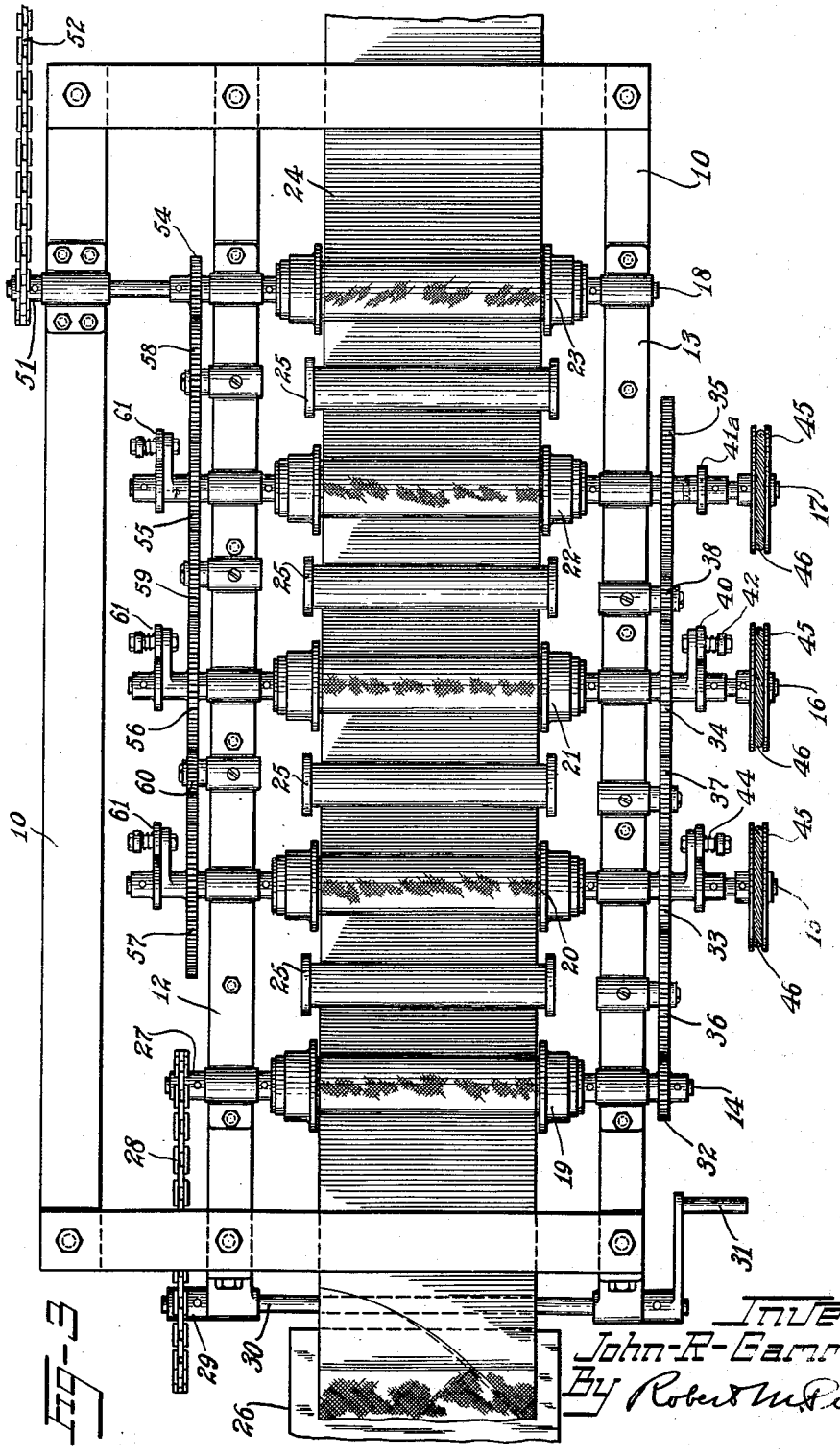


Fig. 3

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UNITED STATES PATENT OFFICE.

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FESTOONING RACK.

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This invention relates to apparatus for availably supporting a variable quantity of continuous strip material between a source of supply and a place of disposal, the specific embodiment herein described being adapted to hold in loops or festoons a variable quantity of spliced tire-fabric between a ply-up table and a tire building machine.

My chief object is to provide an improved festooning rack, having rolls driven by means other than the work, for supporting the loops or festoons and for feeding the work into and out of the rack, whereby the lengths of the festoons may be maintained in determinate relation as the quantity of material in the rack varies, without such strain upon the work as has been necessary, in racks heretofore used, for drawing it through the rack.

Of the accompanying drawings:

Fig. 1 is a side elevation of the preferred embodiment of my invention, parts being broken away for clearness of illustration.

Fig. 2 is a section, on a large scale, on line 2—2 of Fig. 1.

Fig. 3 is a plan view, on a large scale, of part of the apparatus shown in Fig. 1.

Referring to the drawings, the festooning rack comprises a horizontally-disposed, rectangular frame 10 supported upon the upper ends of four vertical corner posts 11, 11, said frame comprising three longitudinal journal beams, upon two of which are mounted journal brackets 12 and 13, respectively, for a plurality of shafts 14, 15, 16, 17 and 18. Secured to said shafts between their brackets are respective flanged rolls 19, 20, 21, 22, and 23, adapted to support the work 24 in a plurality of loops or festoons. The work as shown comprises a strip of fabric, usually made up of lengths of bias-cut rubberized fabric joined, end to end, upon an adjacent ply-up table, 26, in units of proper length and width to be incorporated in successive tires. A light-weight, flanged, floating roll 25 is supported in the loop of each festoon, to hold the two reaches thereof under sufficient tension to prevent them from accidentally contacting and adhering to each other, and to assure adequate driving friction between the work and the supporting rolls when the festoons become very short. Said rollers need not be employed when the rack is used for non-adhesive material and the festoons are not allowed to become excessively short.

In order that the festoons may elongate equally, it is necessary, when the work is fed into the rack, that the work-supporting rolls, except the roll at the delivery end of the series, which remains still during the in-feeding movement, be simultaneously driven at graduated speeds, which is to say at respective speeds which are progressively slower from the receiving end toward the delivery end of the rack, and, when material is fed from the rack, that the supporting rolls, except the roll at the receiving end of the series, be simultaneously driven at respective speeds which are progressively greater toward the delivery end of the rack, the speed ratios being 1:2:3 etc. for the out-feed and the inverse ratio for the in-feed. Means are provided for such driving of the rolls from the receiving end of the rack for the in-feed and from the delivery end of the rack for the out-feed, the two drives being independent of each other.

For drawing into the rack from the ply-up table 26, the shaft 14 is provided at its rear end with a sprocket 27 connected by a sprocket-chain 28 with a sprocket 29 mounted upon one end of a shaft 30, the latter being suitably journaled on two of the corner posts 11 adjacent the end of the ply-up table 26 and provided at its other end with a hand-crank 31.

The driving mechanism for the in-feeding movement of the intermediate rolls comprises gears 32, 33, 34 and 35, of progressively greater diameter, the gear 32 being secured upon the shaft 14 of the roll 19, and the other gears of the series being loosely journaled upon the shafts of the adjacent rolls in the order given. All of the gears of the series are connected, for rotation in the same direction, by idler gears 36, 37, 38 journaled on respective stub shafts projecting from the bracket 13.

Each of the gears 33, 34 and 35 has driving connection with the shaft on which it is mounted through a one-way friction clutch, shown clearly in Fig. 2, adapted to drive the shaft only in a forward feeding movement.

The construction of the several clutches being the same, a description of the one associated with the gear 35 will serve for

all. The hub of said gear is formed with a radial arm 35ª, in the outer end of which is mounted a spindle 39, a circular disc 40 being eccentrically pivoted upon the latter. The periphery of said disc yieldingly engages the periphery of a concentric flange 41ª formed on a collar 41 secured to the shaft 17, said disc being urged to rotate on its spindle by a torsion spring 44 connecting it with a collar 42 secured upon the spindle 39 by a set-screw 43.

For the forward rotation of any one of the rollers 20, 21, or 22, independently of the others, to equalize the length of the festoons upon occasion, as in the initial threading of the work through the rack, each of the shafts 15, 16 and 17 has secured upon its front end a grooved pulley 45, and an endless pull-cord 46, mounted on said pulley, hangs within reach of the operator, the one-way clutch being adapted to permit the shaft to turn in a forward feeding movement independently of the gearing.

A tire-building machine 47 is shown adjacent the delivery end of the rack, said machine including a fabric stretching drum 48 and guide rollers 49, 49, adapted to receive the fabric strip from the rack and pass it on to the tire-core 50. For withdrawing the strip from the rack at the same speed as that at which it passes to the tire core, the shaft 18 of the roller 23 at the delivery end of the machine is provided at its rear end with a sprocket 51 connected by a sprocket chain 52 with a sprocket 53 on the tire-building machine, said sprocket 53 being so geared to the stretching drum 48 as to drive the roller 23 at the same surface speed as said drum.

For driving the several strip-supporting rolls of the rack at suitable speeds to keep the festoons even during the out-feed, the shaft 18 is connected with the shafts 17, 16, and 15 by driving means similar to that described with reference to the in-feed, but in the reverse order as to driving speeds.

Said driving means comprises a gear 54 secured to the shaft 18 and gears 55, 56, and 57, of progressively larger diameter, loosely journaled on the rear ends of the shafts 17, 16 and 15 respectively, said gear having driving connection with each other through intermediate idler gears 58, 59, 60 journaled on respective stub shafts mounted in the journal bracket 12. The gears 55, 56, 57 have driving connection with the respective shafts on which they are journaled through one-way friction clutches 61, 61, of the same construction as those described for the in-feeding movement, except that, while adapted for forward-feeding movement only, they are positioned at the rear of their respective gears.

In the operation of the rack, which will be understood from the foregoing description, the feeding in and withdrawing of the fabric strip are preferably effected in alternation and not simultaneously, so that the festoons will be maintained at equal length. The construction, however, does not preclude the simultaneous operations of feeding in and withdrawing, except that the festoons are thereby caused to become of unequal length, because each strip-supporting roll is driven only by that one of the two driving mechanisms which at any given moment is adapted to drive it at the faster speed. The festoons readily may be restored to equal length, however, in case of inadvertent simultaneous in-feeding and out-feeding, by manipulation of the pull cords 46, since the festoons which become the longer are those nearer the receiving end of the rack, requiring only a forward feed, permitted by the one-way clutches, for equalization.

The device is simple in construction and positive in its operation, and as the force of the floating rollers 25 may be very small, the fabric strip 24 may be passed through the device without substantial strain, so that elongation or breaking of extensible or fragile strip material may be avoided.

My invention is susceptible of modification within its scope, and I do not wholly limit my claims to the specific construction described.

I claim:

1. A festooning rack comprising a series of rolls adapted to engage respectively in successive loops of a continuous strip of material to feed the same through the succession of loops, means common to said rolls for driving them in a determinate speed ratio inherent in the said means without acting through the work, and other means common to said rolls for driving them in a determinate speed ratio inherent in the said means and differing from that of the first said means, without acting through the work, each of said means being operable without operation of the other, and the speed ratio of each being such as to vary determinately the relative quantities of material in the several loops.

2. A festooning rack comprising a series of rolls adapted to engage respectively in successive loops of a continuous strip of material to feed the same through the succession of loops, gearing common to said rolls for driving them at speeds graduated along the series so as substantially to equalize elongation of the several loops in an in-feeding of material, and other gearing common to said rolls for driving them at inversely graduated speeds such as substantially to equalize shortening of the several loops in an out-feeding of material, each of the said gearings being adapted to be driven without driving of the other.

3. A festooning rack as defined in claim 2 including a one-way clutch mechanism operatively connecting each gearing with each of the intermediate rolls of the series.

4. A festooning rack as defined in claim 2 including means, operable independently of the defined gearing, for rotating rolls of the series individually.

5. A festooning rack as defined in claim 2 in which each gearing comprises a spur gear for each roll, journaled concentrically therewith, and idler gears alternating and meshed with the said gears.

In witness whereof I have hereunto set my hand this 27th day of October, 1924.

JOHN R. GAMMETER.