

June 10, 1930.

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1,763,594

TENSIONING DEVICE FOR FABRICS

Filed Sept. 29, 1928

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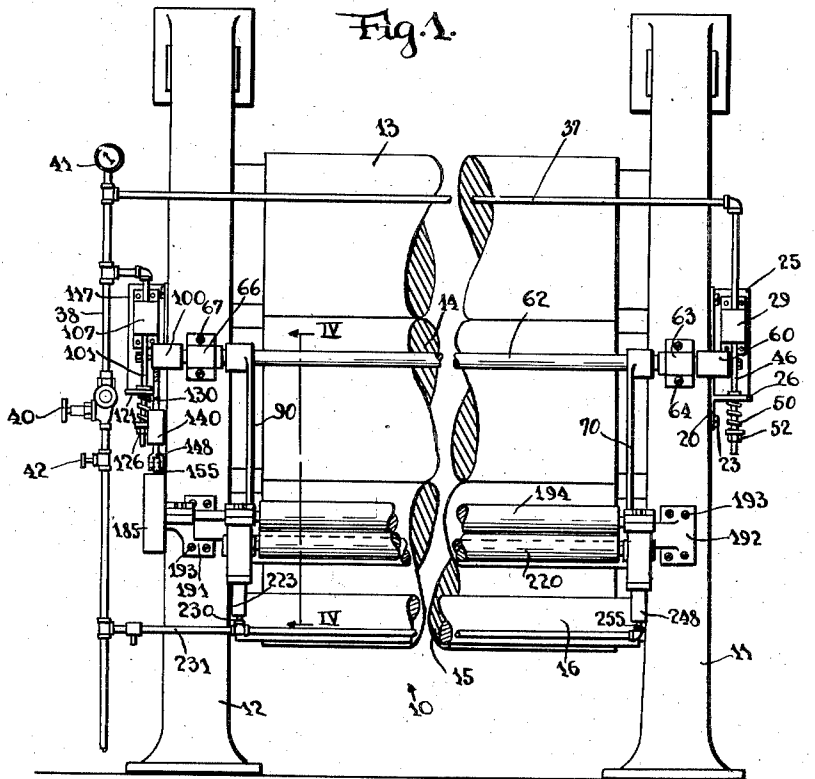
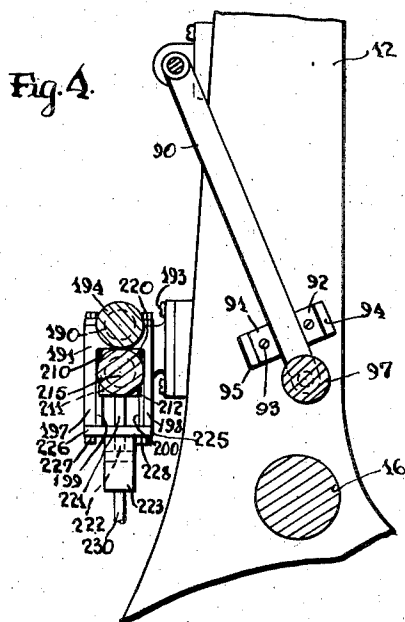
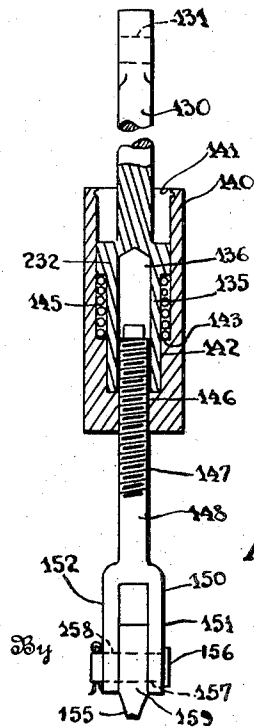


Fig. 5.

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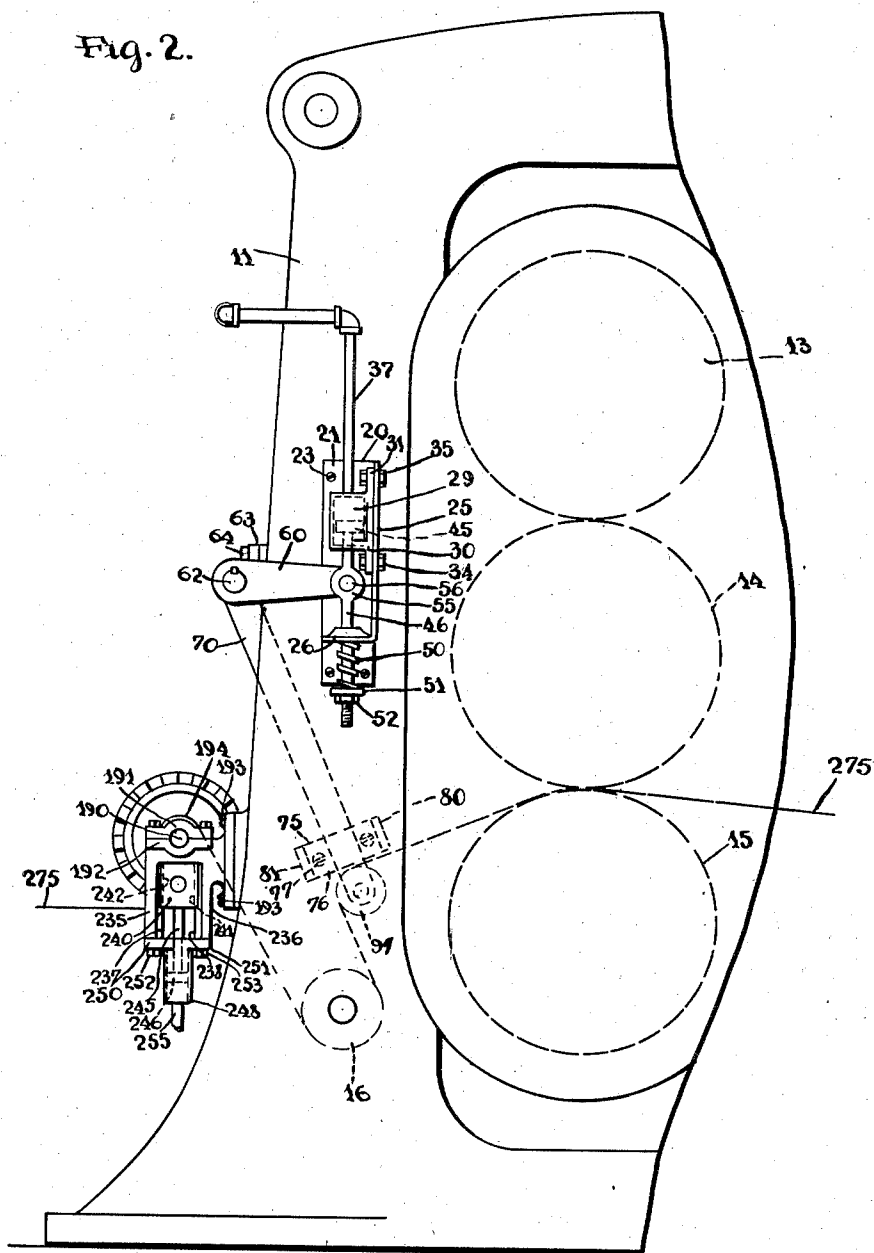
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Fig. 2.



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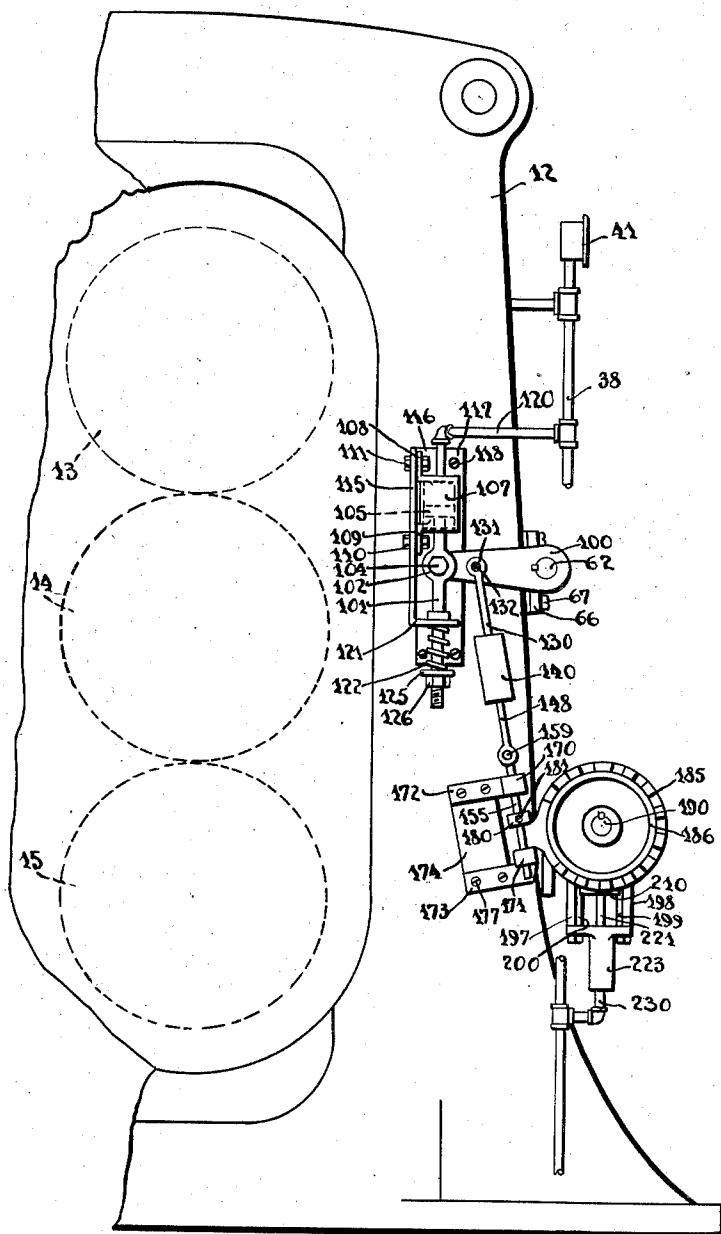
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TENSIONING DEVICE FOR FABRICS

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Fig. 3.



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UNITED STATES PATENT OFFICE

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TENSIONING DEVICE FOR FABRICS

Application filed September 29, 1928. Serial No. 309,243.

The invention relates to devices for tensioning fabric and it has particular relation to devices of the above designated character which shall be capable of maintaining a constant tension on fabric during its passage through fabric treating machines.

An object of the invention is to provide an adjustable device for tensioning moving fabric, which is automatically governed by the movement of such fabric.

Fabric material employed generally in building the carcasses of pneumatic tires and other similar articles is manufactured by passing a strip of textile material through a calendering machine for the purpose of impregnating it with rubber. During the latter operation, it is very desirable that the tension on the fabric be maintained constant, in order to obviate the forming of wrinkles, to insure the forcing of the rubber equally into interstices between the cords of the fabric, and to provide a finished material, all portions of which will be uniformly tensioned.

This embodiment of the invention comprises a floating roller, over which the fabric is conducted, which roller is connected by pivoted arms to a plunger adjustably controlled by fluid pressure. The arms in turn are connected by linkage to a brake adapted to be applied about a drum on one of two engaging rollers between which the fabric also is conducted. The tension on the fabric determines the position of the floating roller and when this tension is less than that which the pressure on the plunger previously has been adjusted to permit, the roller moves and, in turn, the plunger effects an application of the brake to the drum. On the other hand, when the tension on the fabric becomes greater than that desired, the fabric moves the roller in an opposite direction which results in a proportionate release of such brake, thereby lessening the tension.

For a better understanding of the invention, reference may now be had to the accompanying drawing forming a part of the specification, of which:

Fig. 1 is a fragmentary front elevational view of a calendering machine, having an

embodiment of the invention mounted thereon;

Fig. 2 is a fragmentary end elevational view of the machine shown by Fig. 1 and taken from the right-hand side thereof;

Fig. 3 also is a fragmentary end elevational view of the machine shown by Fig. 1, but taken from the left-hand side thereof;

Fig. 4 is a fragmentary cross-sectional view, taken substantially along the line IV—IV of Fig. 1; and

Fig. 5 is an enlarged cross-sectional view of a resilient connection between two links embodied in the structure shown by Figs. 1 and 3.

Referring to Fig. 1 a calendering machine comprises a pair of vertically disposed frame members 11 and 12 which rotatably support a plurality of calendering rolls 13, 14 and 15. Another roll 16, adapted to guide fabric as the latter is conducted between the calendering rolls, also is journaled in the frame members 11 and 12 and is disposed in front of the roll 15, below the axes thereof.

As best shown by Fig. 2 an angle bracket 20, provided on the outer side of the frame member 11 adjacent the roll 14, comprises a base 21, secured by stud bolts 23 to the frame member 11; an angle portion 25 extending perpendicularly and outwardly from the base 21 at one edge thereof; and a web 26 at the lower end of the angle portion and extending across the base perpendicularly to both the base and the angle portion. A cylinder 29, having integral apertured lugs 30 and 31 projecting therefrom, is secured to the angle portion 25 adjacent the base 21 of the bracket 20, by bolts 34 and 35. The upper end of the cylinder is connected by a conduit 37 to a fluid pressure supply conduit 38 (Fig. 1) which is provided with a suitable pressure control valve 40 and gauge 41. Another valve 42 is provided in the lower portion of the conduit 38 in order to shut off the supply of fluid whenever desired.

The cylinder 29 is provided with a piston 45 therein which is integral with a vertically disposed rod 46 mounted for sliding movement in the lower end of the cylinder and the web 26 of the bracket 20. Below the web 26,

the rod is encircled by a spring 50 which is confined between the web and a washer 51 mounted on the rod and retained thereon by a nut 52. Intermediate the web 26 and the cylinder 29, the rod 46 is provided with an eye 55 for receiving a stud bolt 56 upon which the end of an arm 60 is pivotally mounted. The arm is keyed to a shaft 62 which is journaled in bearing brackets 63 and 66 secured by bolts 64 and 67 respectively, to the front surfaces of the frame members 11 and 12, respectively.

Adjacent the inner side of the frame member 11 an arm 70 is secured to the shaft 62 and extends downwardly to a point adjacent and in front of the roll 15. The arm is limited in its pivotal movement with the shaft 62, by the outwardly projecting legs 80 and 81 of a U-shape bracket 75 having its base 76 secured by bolts 77 to the inner face of the frame member 11. A second arm 90 (Fig. 4) is secured to the shaft 62 adjacent the inner surface of the frame member 12, and like the arm 70, is limited in its pivotal movement with the shaft 62 by the outwardly projecting legs 94 and 95 of a U-shape bracket 91 having a base portion 92 secured by bolts 93 to the inner face of the frame member 12. A roller 97 is journaled in the lower ends of the arms 70 and 90.

Beyond the bearing bracket 66 (Fig. 3) the shaft 62 has an arm 100 secured thereon, which arm is identical with the aforesaid arm 60 secured on the opposite end of the shaft. This arm at its outer end is pivotally connected to the intermediate portion of a rod 101 by a stud bolt 104 loosely projecting through an eye 102 in the rod and threaded into the arm. The upper end of the rod is connected to a piston 105 which is disposed within a cylinder 107, having lugs 108 and 109 secured by bolts 110 and 111 to an angle portion 115 of an angle bracket 116. The latter has a base 117 which is secured by bolts 118 to the outer surface of the frame member 12. A conduit 120 connects the upper end of the cylinder 107 to the fluid pressure supply conduit 38. The lower end of the rod 101 is slidably mounted in an apertured web 121 projecting from the lower end of the angle portion 115 of the bracket 116 across the base 117 thereof and is encircled by a spring 122 disposed between the web and a washer 125 retained on the lower end of the rod by a nut 126.

The arm 100, intermediate its ends is connected by a stud bolt 132 to a rod 130 having an eye 131 at its upper end. The lower end of the rod 130 is provided with an enlarged annular shoulder 232 (Fig. 5) and a relatively smaller tubular portion 135 projecting below the latter. An internal opening 136 in the lower end of the rod 130 extends from the end thereof longitudinally a distance equal to substantially the combined lengths of the portion 135 and the shoulder 232. The lower

portion of the rod including the shoulder 232 and the portion 135 normally is disposed within a cylindrical sleeve 140 which is open at its upper end as indicated at 141, and adjacent its lower end has its inner peripheral surface reduced as indicated at 142, thus providing an annular shoulder 143. Between the latter and the shoulder 232 on the rod 130, a spring 145 is disposed in encircling relation to the rod, thus providing a resilient connection between the rod and sleeve. The lower end of the sleeve is closed except for an opening 146 which is threaded to receive the threaded end 147 of a downwardly extending rod 148, the threaded portion 147 of which may project into the open portion of the sleeve 140 and within the opening 136 in the lower end of the rod 130.

At its lower end the rod 148 is provided with a yoke 150 having arms 151 and 152, the lower ends of which are pivotally connected to another rod 155 by means of a pin 156 projecting through an opening 159 in the latter and openings 157 and 158 in the lower ends of the arms. The rod 155 (Fig. 3) is slidably mounted in bosses 170 and 171 integral with brackets 172 and 173 which are secured to a plate 174 and the outer face of the frame member 12 by screws 177. Intermediate the bosses 170 and 171, the rod has a collar 180 secured thereon by a set screw 181. A divided brake band 185, having one end secured to the collar 180 and its other end secured to the boss 171, is disposed about a drum 186 which is keyed to a shaft 190 journaled in bearing brackets 191 and 192 (Fig. 1) secured by screws 193 to the front faces of the frame members 12 and 11, respectively. This shaft also supports a roll 194 (Fig. 4) composed of rubber or other suitable resilient material. The lower end of the bracket 191 is provided with a pair of spaced depending legs 197 and 198 which have guide surfaces 199 and 200 disposed on their adjacent sides. A block 210 slidably disposed between the legs 197 and 198 has grooves 211 and 212 provided in opposite faces thereof which coact with the guide surfaces 199 and 200 in the legs. One end of a shaft 215 is journaled in the block, and like the shaft 190, is provided with a rubber roll indicated at 220. The lower face of the block is connected by a rod 221 to a piston 222 disposed within a cylinder 223 which has projecting portions 225 and 226 connected by bolts 227 and 228 to the ends of the legs 197 and 198. The lower end of the cylinder is connected by a conduit 230 to a second conduit 231 which is connected in turn to the fluid pressure supply conduit 38. As shown by Fig. 2 the bracket 192, like the bracket 191, is provided with legs 235 and 236 having guide surfaces 237 and 238 between which a block 240 is slidably mounted by means of grooves 241 and 242 in opposite faces of the block receiving the guide

surfaces 237 and 238. The block 240 supports the other end of the shaft 215. The lower face of the block is connected by a rod 245 to a plunger 246 disposed in a cylinder 248 having laterally projecting portions 250 and 251 at its upper end which are secured by bolts 252 and 253 to the lower ends of the legs 235 and 236. The lower end of the cylinder also is connected by a conduit 255 to the conduit 231.

In operation of the above described apparatus, fabric 275 during its passage between the rolls 14 and 15 of the calender also passes beneath the roll 220, thence upward between this roll and the roll 194, thence over the latter roll and beneath the roll 16, thence over the floating roller 97 and between the rolls 14 and 15 of the calender. In order to maintain a predetermined constant tension on the fabric, the valve 40 is adjusted until the gauge 41 reads the quantity of pressure required. This supplies fluid under pressure to the cylinders 29 and 107 to move the arms 60 and 100 downwardly against the action of the springs 50 and 122 respectively. The fluid pressure also being supplied to the cylinders 223 and 248 causes upward movement of the roller 220, whereby the fabric is firmly engaged between the latter roll and the roll 194.

During the movement of the fabric through the calendering machine 10, as long as constant tension is maintained thereon, the roller 97 and the arms 70 and 90, are maintained substantially midway between the legs of the U-shape brackets 75 and 91 disposed on the inner side of the frame members 11 and 12. Should the tension on the fabric be decreased, however, the arms 70 and 90 will be moved downwardly by the fluid pressure in the cylinders 29 and 107, which movement also will cause application of the brake 185 on the drum 186. The application of the brake will cause a firmer engagement of the fabric between the rolls 194 and 220, and hence will cause an increase in the tension of the fabric, which, in turn, will cause the arms 70 and 90 to move back to their normal position. In case the tension becomes greater than that desired, the arms 70 and 90 will be moved upwardly, which will cause the brake 185 to be proportionately released, thereby permitting the fabric to travel at a more rapid rate, which will decrease the tension on the fabric.

From the foregoing description, it is apparent that a device has been provided by means of which constant tension may be maintained on the fabric as it is conducted through the calendering machine. Moreover, it is apparent that the amount of tension may be easily varied since the only operation required is to regulate the pressure of the fluid supplied. Actual use of this device has proven that the arms 70 and 90 normally will be disposed substantially centrally with respect to the arms of the U-shape

brackets which limit their movement, thus establishing in the fabric a tension which does not materially fluctuate.

Although I have illustrated only one form which the invention may assume and have described in detail only a single application thereof, it will be apparent to those skilled in the art that the invention is not so limited but that various minor modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

What I claim is:

1. A fabric tensioning device comprising a floating fabric supporting roller, a fluid pressure controlled member connected to the roller, a plurality of rolls resiliently pressed together through which the fabric is conducted, and retarding means associated with one of the last mentioned rolls and operatively connected to the floating roller.

2. A fabric tensioning device comprising a floating fabric supporting roller, resilient means operatively connected to the roller, a plurality of rolls resiliently pressed together through which the fabric is conducted, and retarding means associated with at least one of the last mentioned rolls, and operatively connected to the floating roller.

3. In a device of the class described, a pair of spaced bearing brackets, a roll journaled in the brackets, a second roll disposed adjacent the first roll and adjustably journaled in the brackets so as to be movable relative to the first roll, and fluid pressure means for urging the rolls toward each other.

4. In a device of the class described, a pair of spaced bearing brackets, a roll stationarily journaled in the brackets, blocks slidable relative to the brackets, each of said blocks supporting an end of a second roll disposed adjacent the first roll, and fluid pressure means operatively connected to the blocks.

5. In a device of the class described, a bracket having a pair of legs projecting therefrom, a bearing block slidably disposed between such legs, and adapted to support an end of a shaft, and fluid pressure means operatively connected to the block.

6. A fabric tensioning device comprising a frame, an arm movably supported upon the frame and having a fabric supporting member, means for normally retaining the arm in a given position, including a rod operatively secured to the arm, and having a piston thereon, a cylinder mounted on the frame and in which the piston is disposed, means for supplying fluid under variable pressure to the cylinder, a roller over which the fabric is conducted, and braking means for the roller, said braking means being operatively connected to the arm.

7. A fabric tensioning device comprising a frame, an arm movably supported upon the frame and having a fabric supporting mem-

ber, means for normally retaining the arm in a given position, including a rod operatively secured to the arm, and having a piston thereon, a cylinder mounted upon the frame and in which the piston is disposed, means for supplying fluid under variable pressure to the cylinder, a roller over which the fabric is conducted, braking means for the roller, and means including a resilient device for operatively connecting the braking means to the arm.

8. A fabric tensioning device comprising a frame, an arm movably supported upon the frame and having a fabric supporting member, means for normally retaining the arm in a given position, including a rod operatively secured to the arm, said rod having a piston thereon, a cylinder mounted on the frame and in which the piston is disposed, means for supplying fluid under variable pressure to the cylinder, a pair of rollers between which the fabric is conducted, and braking means applied to one of the rollers and operatively connected to the arm, the other roller being movable with respect to the first roller, and resilient means for urging said other roller towards the first roller.

9. A fabric tensioning device comprising a frame, an arm movably supported upon the frame and having a fabric supporting member, means for normally retaining the arm in a given position comprising a rod operatively secured to the arm and having a piston at one end thereof, a cylinder mounted upon the frame and in which the piston is disposed, a spring encircling the other end of the rod, a stationary bracket on the frame abutting one end of the spring, an adjustable element mounted upon the rod for engaging the other end of the spring, means for supplying fluid under variable pressure to the cylinder, a roller over which the fabric is conducted, and braking means for the roller, said braking means being operatively connected to the arm.

10. A fabric tensioning device comprising a frame, a shaft journaled in the frame, an arm secured to the shaft, and having a fabric supporting member at its free end, a second arm secured to the shaft, a rod pivoted intermediate its ends to the free end of the second arm, said rod having a piston at one end, a cylinder provided with a bracket for securing it to the frame, said piston being disposed in the cylinder, means for supplying fluid under variable pressure to the cylinder, a spring encircling the other end of the rod, an adjustable element on the rod for engaging one end of the spring, the other end of the spring engaging the bracket, a roller over which the fabric is conducted, braking means for the roller, and a linkage connecting said second arm to the braking means.

11. A fabric tensioning device comprising a frame, a shaft journaled in the frame, an

arm secured to the shaft, and having a fabric supporting member at its free end, a second arm secured to the shaft, a rod pivoted intermediate its ends to the free end of the second arm, said rod having a piston at one end, a cylinder provided with a bracket for securing it to the frame, said piston being disposed in the cylinder, means for supplying fluid under variable pressure to the cylinder, a spring encircling the other end of the rod and abutting at one end an adjustable element on the latter, and at its other end the bracket secured to the frame, a roller over which the fabric is conducted, braking means for the roller, and a linkage connecting said second arm and the braking means, said linkage including a resilient device.

In witness whereof, I have hereunto signed my name.

Signed at Akron, in the county of Summit and State of Ohio, U. S. A., this 28th day of September, 1928.

MAX C. NELSON.