Dec. 2, 1930. C. F. SCHNUCK 1,783,263

CALENDER

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Fig. 1.

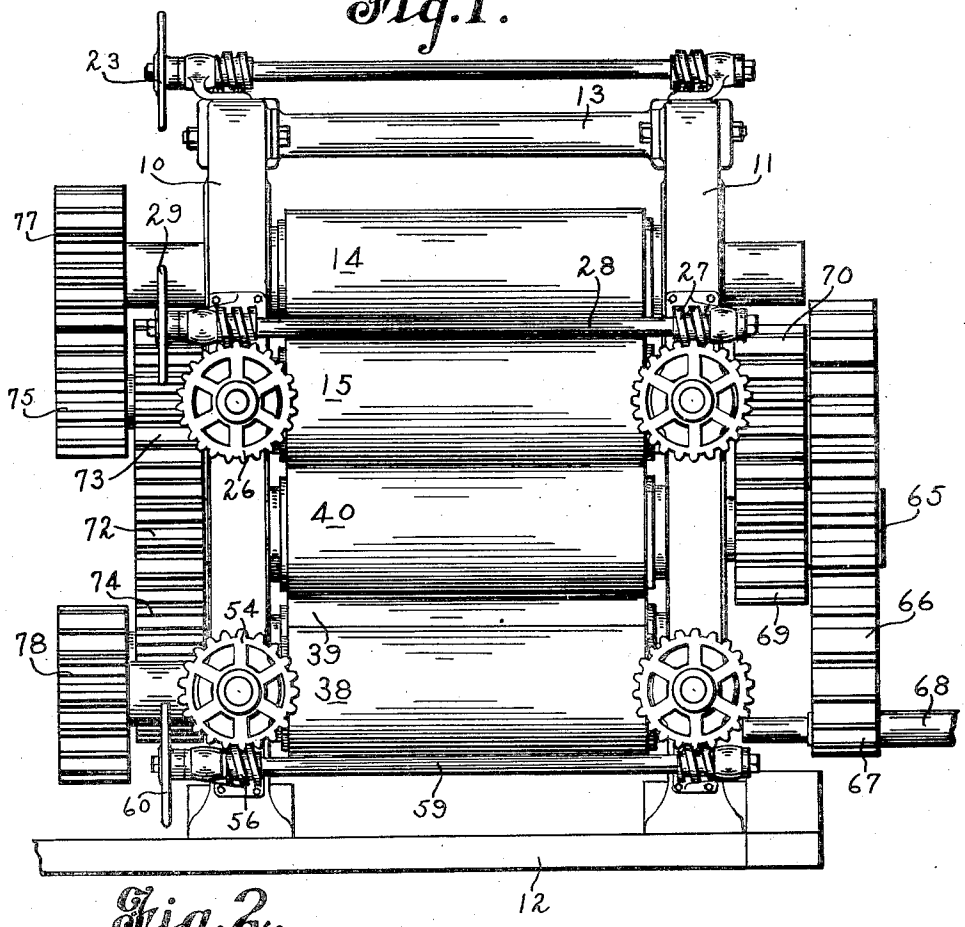
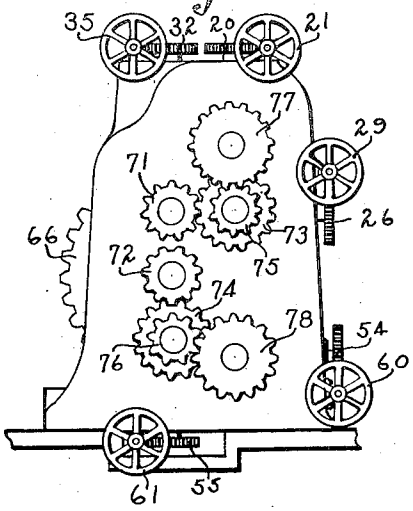


Fig. 2.



Inventor

Carl F. Schnuck

By Henry E. Rockwell

Attorney

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CALENDER

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Fig. 3.

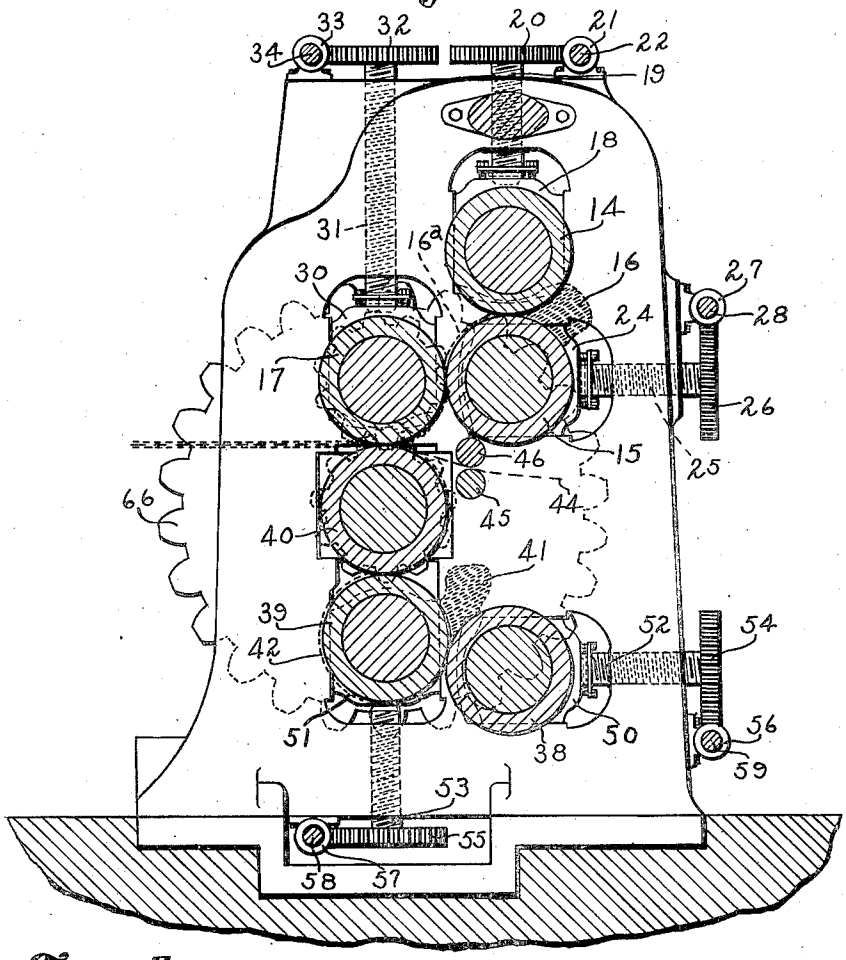
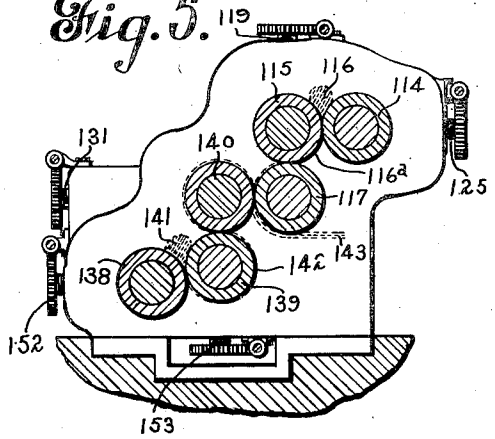


Fig. 5.



Inventor

Carl F. Schnuck

By Henry E. Gorbandt

Attorney

Dec. 2, 1930. C. F. SCHNUCK 1,783,263

CALENDER

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Fig. 4.

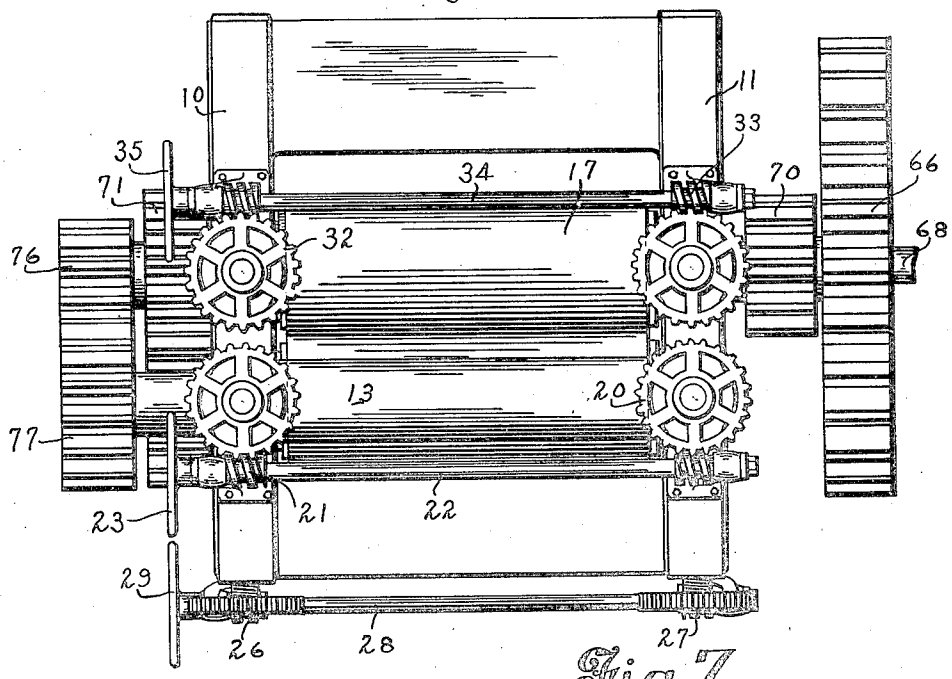


Fig. 7.

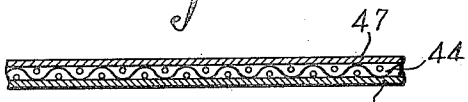
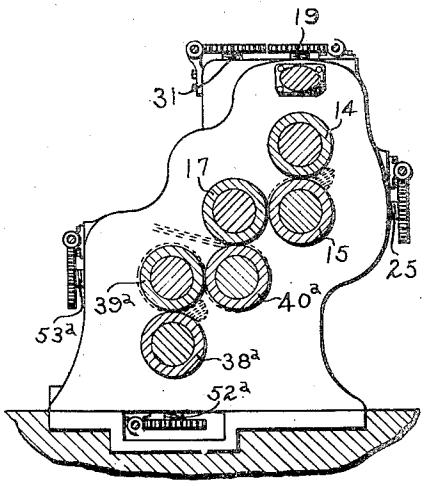


Fig. 8.



Fig. 6.



Inventor

Carl F. Schnuck

By Henry E. Rockwell

Attorney

Patented Dec. 2, 1930 1,783,263

UNITED STATES PATENT OFFICE

CARL F. SCHNUCK, OF NEW HAVEN, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO FARREL-BIRMINGHAM COMPANY, INCORPORATED, OF ANSONIA, CONNECTICUT, A CORPORATION OF CONNECTICUT

CALENDER

Application filed September 7, 1926. Serial No. 134,005.

This invention relates to calendering machines, and more particularly to calenders of the type used, for example, in the rubber industry and designed to receive a bank of gum rubber, which is broken down and reduced to sheet form between the rolls of the machine. According to the embodiment of my invention illustrated and described, two banks of rubber gum may be simultaneously sheeted and reduced and thereafter combined or laminated either with each other or rolled upon a sheet of cord fabric to make rubber fabric used, for example, in the construction of automobile tire casings.

Due to the strains imposed upon such machines, they are required to be of heavy and substantial construction, and at the same time a ready and accurate adjustment of the rolls with respect to each other is necessary. As the rolls are often arranged in trains so that one roll, an intermediate roll, for example, will cooperate with the adjacent rolls on each side thereof, it is particularly advantageous to be able to adjust each of the adjacent rolls so as to vary the distance between two cooperating rolls without affecting the adjustment of the remaining rolls of the train.

One object of my invention is to provide a calendering machine having a plurality of cooperating rolls so arranged that the adjustment between any two of the rolls may be effected without disturbing the adjustment between the remaining rolls.

A further object of my invention is to provide a calendering machine having a train of rolls wherein certain of the rolls cooperate with two or more adjacent rolls, and the adjustment between these rolls and one of the adjacent rolls may be effected without disturbing the adjustment with respect to the other adjacent roll.

A still further object of my invention is the provision of a calendering machine wherein a plurality of banks of rubber stock may be simultaneously reduced to sheet form and then carried between laminating rolls whereby the sheets are combined all in one operation.

Another object of my invention is to provide a calendering machine, having means for sheeting a plurality of banks of rubber gum and combining or laminating the sheets so formed, wherein the rollers may be individually adjusted so that the adjustment between any two thereof may be varied without disturbing the adjustment between the remaining rolls.

To these and other ends the invention consists in the novel features and combination of parts to be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is a front elevational view of a calender embodying my invention;

Fig. 2 is a side elevational view of the machine;

Fig. 3 is a transverse sectional view;

Fig. 4 is a top plan view;

Fig. 5 is a sectional view similar to Fig. 3, showing a modified form of my invention;

Fig. 6 is a view similar to Fig. 5 showing a further modification;

Fig. 7 is a sectional view of a laminated rubber cord fabric as it comes from the machine;

Fig. 8 is a similar view of a product of the machine, consisting of two sheets of laminated rubber.

As illustrated in Figs. 1 to 4 of the drawings, my improved calendering machine comprises a pair of end frames or housings 10 and 11, supported upon a base 12 and rigidly secured together at their upper ends by the transverse brace 13. Mounted in suitable bearings in the housings 10 and 11, are a pair of cooperating rolls 14 and 15, the latter, in this instance, being mounted below the former to cooperate therewith in receiving a bank of rubber gum 16 to break it down and reduce it to sheet form. Adjacent the roll 15 and cooperating therewith is a roll 17, designed to cooperate with the roll 15 in further reducing the sheet of gum 16^a issuing from the rollers 14 and 15 into a thinner sheet. It will be apparent that I obtain two passages of the rubber stock between the three rolls 14, 15 and 17 so as to secure two reductions of the stock and to obtain a sheet of the desired thickness.

The roll 14 is mounted in movable bearing blocks in the housings 10 and 11, one of these being shown at 18 on Fig. 3. It will be understood that the other end of the roll is mounted in a similar manner in the housing 10. Secured to each of these bearing blocks is an adjusting screw 19, carrying at its upper end a worm wheel 20 with which meshes a worm 21 secured upon a shaft 22 mounted upon the upper ends of the housings 10 and 11 and carrying a hand wheel 23 by which the two ends of the roll may be simultaneously adjusted. Likewise, the roll 15 may be adjusted by means of the bearing blocks 24, adjusting screws 25, worm wheels 26, worms 27, shaft 28 and hand wheel 29. In the embodiment of my invention now being described, the roll 14 is susceptible of adjustment in a vertical direction, while the roll 15 is adjusted in a horizontal direction. It will be seen, therefore, that the roll 15 may be adjusted to vary the distance between its center and the center of the roll 17 without materially affecting the adjustment between it and the roll 14. Likewise, adjustment between the rolls 14 and 15 may be made by adjusting the roll 14 vertically without changing the adjustment between the rolls 15 and 17.

The roll 17 may be adjusted in a manner similar to the rolls 14 and 15 by means of the bearing blocks 30, adjusting screws 31, worm wheels 32, worms 33, shaft 34 and the hand wheel 35. The purpose of this adjustment will be explained hereinafter.

A second set of three rolls 38, 39 and 40 is likewise mounted in the housings 10 and 11, the roll 40 being mounted in fixed bearings in this instance, and cooperating with the roll 17. The rolls 38 and 39 are adapted to receive therebetween a second bank of rubber gum 41, and after this bank is broken down and sheeted to some extent by these rolls the sheet passes around the roll 39, as indicated by the dotted line at 42 on Fig. 3, and between the rolls 39 and 40, where the sheet is further reduced in thickness.

The sheet issuing from the rolls 39 and 40, and also the sheet issuing from the rolls 15 and 17 are then passed between the rolls 17 and 40 to be combined or laminated into a single two ply rubber sheet 43, as shown in Fig. 8. If it is desired to make a rubberized fabric, such as may be used in the manufacture of automobile tire casings, a sheet of fabric 44 may be supplied by the feed rollers 45 and 46, between the two sheets of rubber gum so as to apply a sheet of rubber 47 and 48 to each side of the fabric 44, as shown in Fig. 7.

Considered in pairs, the rolls 14 and 15 and likewise the rolls 38 and 39 may be termed the breaking down rolls, while the rolls 15 and 17 and 39 and 40 may be termed the smoothing out rolls, and the rolls 17 and 40 may be called the combining or laminating rolls. It will be apparent that with the six rollers arranged as shown, three passages of each of the banks of rubber gum between two cooperating rollers are obtained. That is, with the use of the six rollers, I am enabled to effect two reductions of each bank of gum and laminate or combine the sheets.

As described, the roller 40 is mounted in fixed bearings in the housings, the adjustment between it and the roll 17 being obtained by vertical movement of the latter. The rolls 38 and 39 are mounted, however, in sliding bearing blocks 50 and 51 to which are secured adjusting screws 52 and 53, carrying worm wheels 54 and 55 with which mesh the worms 56 and 57 on the shafts 58 and 59, the shafts being rotatable by the hand wheels 60 and 61.

The rolls may be driven in any preferred manner. As illustrated, the shaft 65 of the fixed roll 40 carries a gear 66, which meshes with a gear 67 on the drive shaft 68. A pinion 69 on the shaft 65 engages with a pinion 70 on the shaft of the roll 17. At their opposite ends the shafts of the rolls 40 and 17 carry pinions 71 and 72, which mesh with gears 73 and 74 on the shafts of the rolls 15 and 39, respectively. Also secured to these last named shafts are pinions 75 and 76, which mesh with gears 77 and 78 on the shafts of the rolls 14 and 38.

It will be seen that adjustment between the three lowermost rolls may be obtained in a manner similar to that between the three upper rolls. That is, the roll 39 may be adjusted vertically to vary its distance from the roll 40, without materially disturbing its adjustment with respect to the roll 38, and likewise, the roll 38 may be adjusted in a horizontal direction with respect to the roll 39. As all of the remaining rolls are capable of adjustment in the manner described, the roll 40 may be fixed in the frame and serve as a driving roll, its effective distance from the cooperating rolls 17 and 39 being varied by adjustment of the latter. The operation of this embodiment of my invention will be readily understood from the foregoing description.

In Fig. 5 of the drawings, I have shown a modified arrangement of a six roll calendering machine, wherein one set of three rolls 114, 115 and 117 are shown in somewhat different arrangement from that of the corresponding rolls 14, 15 and 17 of the form of my invention, described above. In this instance, the rolls 114 and 115 are placed in horizontal alignment and are designed to receive between them the bank of rubber gum 116, and reduce it to sheet form, as shown at 116a, after which it is passed between the two rolls 115 and 117 to be further reduced. A second set of rolls, 138, 139 and 140 are arranged to operate in like manner on a second bank of rubber gum 141, the sheet 142 issuing from the rolls 138 and 139 being passed between the

rolls 139 and 140, then around the roll 140 to be laminated with the sheet 116ª, as shown at 143.

In this form of my device, the roll 114 may be adjusted by the adjusting screw 125, and likewise, similar adjusting mechanisms 119, 131, 152 and 153 are provided respctively for the rolls 115, 140, 138 and 139. In this instance, the roll 117 is fixed and may serve as a driving roll. It will be apparent that in this arrangement also I may vary the adjustment between any two of the cooperating rolls without affecting the adjustment between the remaining.

In Fig. 6 of the drawings I have shown a further modification wherein the rolls 14, 15 and 17 are arranged, as shown in Fig. 1, and provided with similarly operated adjusting screws 19, 25 and 31. The roll 40ª is likewise disposed below the roll 17, but in this instance, the roll 39ª is disposed in horizontal alignment with the roll 40ª, and the roll 38ª disposed below the roll 39ª. These rolls 38ª and 39ª are provided with adjusting screws 52ª and 53ª, respectively.

It will be obvious that this embodiment of my invention is susceptible of the same operation as described in detail in connection with Figs. 1 to 4.

While I have shown and described some embodiments of my invention, it will be understood that it is not to be limited to all the details shown but is capable of modification and variation within the spirit of the invention and within the scope of the appended claims.

What I claim is:

1. A calender provided with a plurality of rolls adapted to receive therebetween a plurality of banks of stock to reduce the same to sheet form and to combine the sheets with a sheet of fabric, three of said rolls having their axes in alignment, additional rolls cooperating with the end rolls of said aligned rolls, said additional rolls being arranged on the same side of the machine and having their axes in parallel alignment with the axes of the three rolls, and another roll cooperating with one of said additional rolls, said roll having its axis in alignment with the axes of the additional rolls, and means for feeding a sheet of fabric between two of said first named three rolls, said feeding means being arranged on the same side of the machine as said additional rolls.

2. A calender provided with a plurality of rolls adapted to receive therebetween a plurality of banks of stock to reduce the same to sheet form and to combine the sheets with a sheet of fabric, three of said rolls having their axes in vertical alignment, additional rolls cooperating with the end rolls of said vertically aligned rolls, said additional rolls being arranged on the same side of the machine and having their axes substantially in horizontal alignment with the rolls with which they cooperate, and another roll cooperating with one of said additional rolls, said roll having its axis in vertical alignment with the axis of the roll with which it cooperates, and means for feeding a sheet of fabric between the intermediate roll and the upper roll of said first named three rolls having their axes in alignment, and said feeding means being arranged on the same side of the machine as said additional rolls.

In witness whereof, I have hereunto set my hand this 1st day of September, 1926.

CARL F. SCHNUCK.