Oct. 22, 1940. L. C. PHARO 2,219,077

ASBESTOS FIBERIZER

Filed Dec. 1, 1939 3 Sheets-Sheet 1

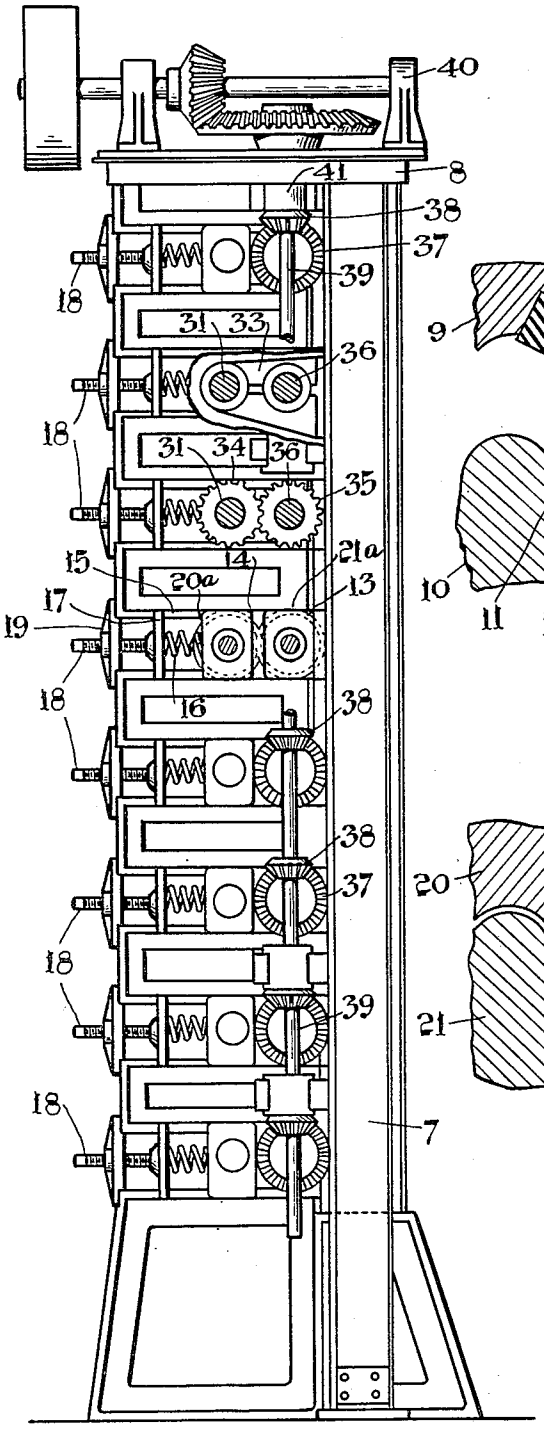


FIG. 1

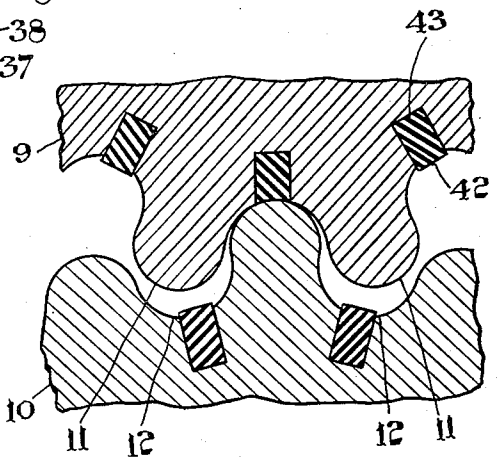


FIG. 3

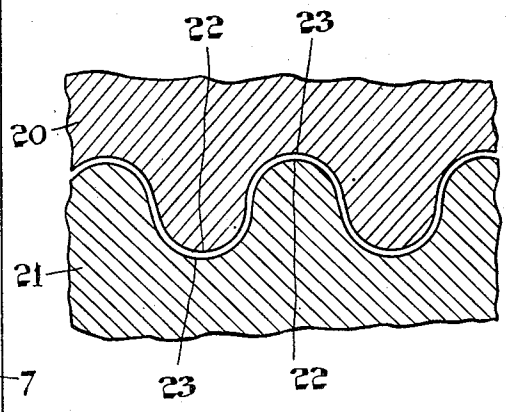


FIG. 4

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ASBESTOS FIBERIZER

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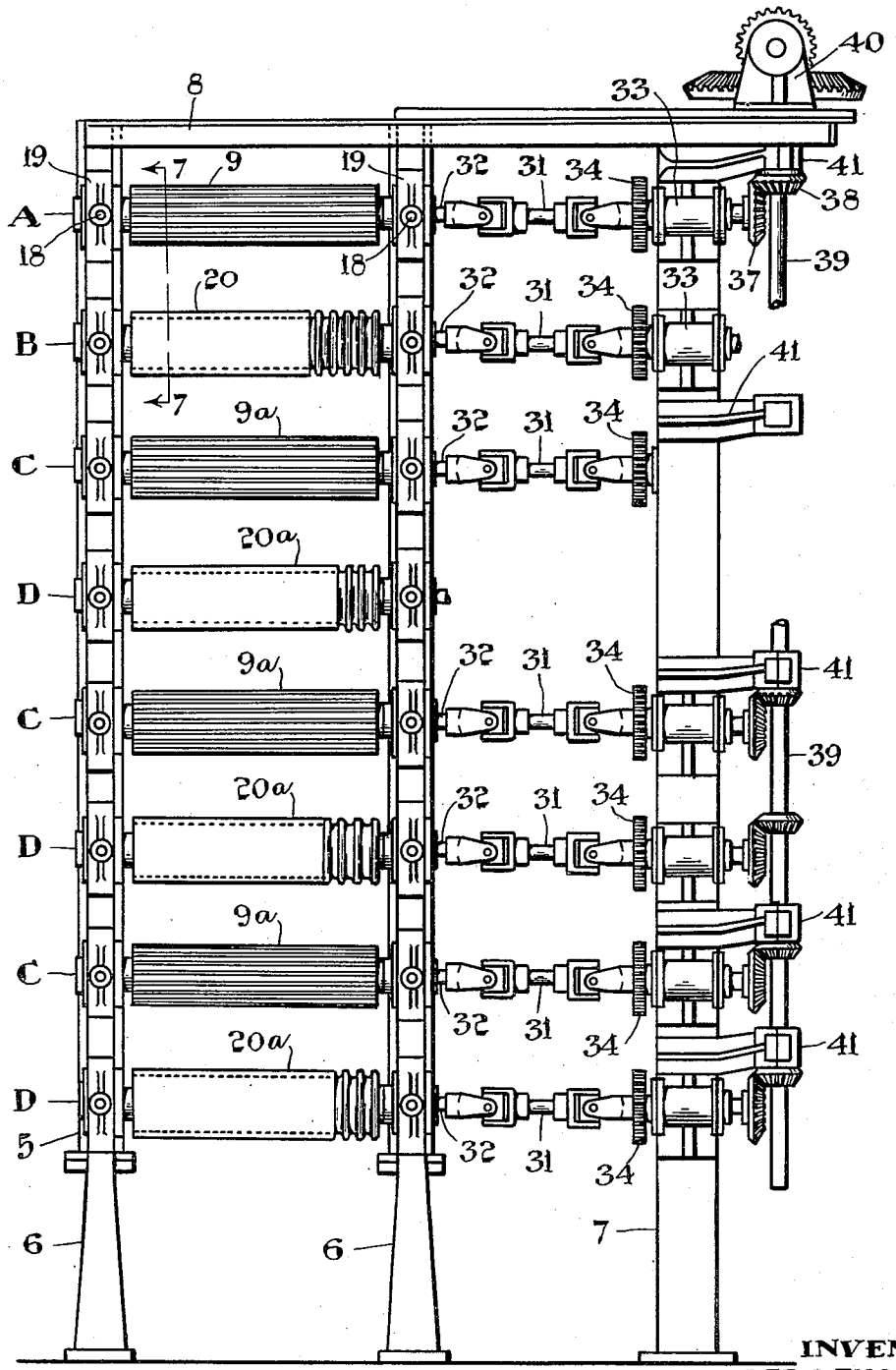


FIG. 2

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ASBESTOS FIBERIZER

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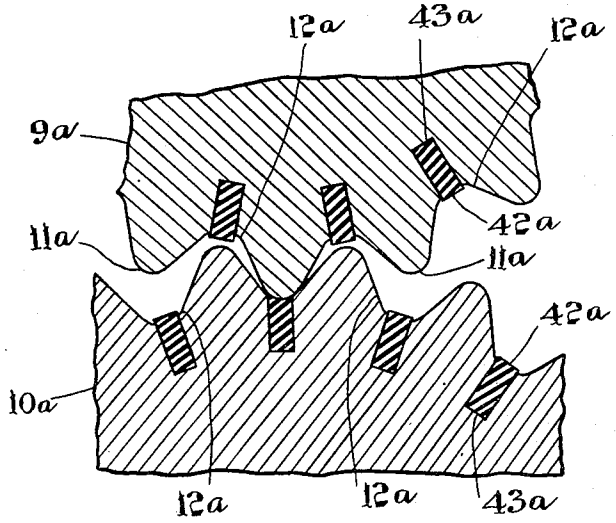


FIG. 5

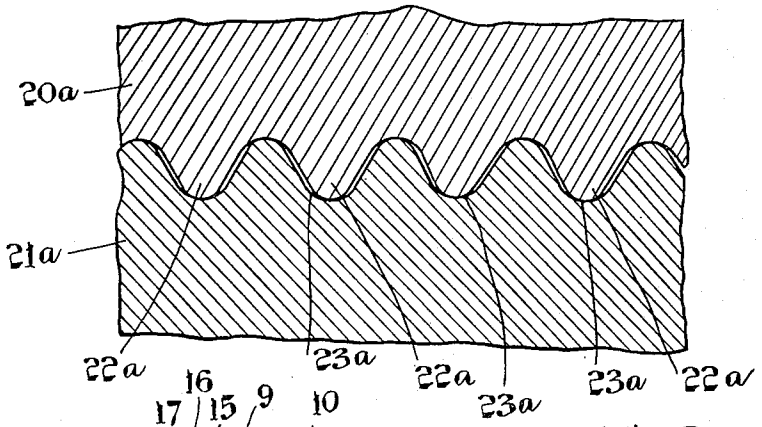


FIG. 6

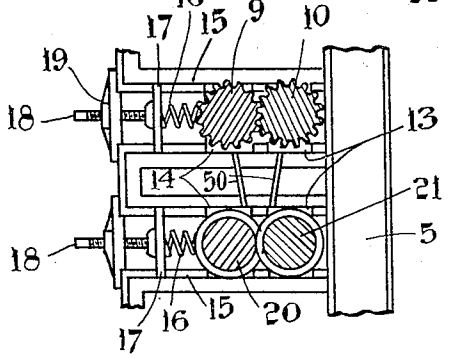


FIG. 7

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ASBESTOS FIBERIZER

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Application December 1, 1939, Serial No. 307,153

7 Claims. (Cl. 19—65)

This invention relates to an apparatus for fiberizing long and short asbestos strands and comprises a plurality of pairs of ribbed rolls by which a moving stream of asbestos is subjected to fiberizing pressure and flexure.

The object of this invention is to subject the long asbestos strands to fiberizing pressure and flexure in a manner which will not cause damage to these long strands and to subsequently subject the short asbestos strands to a similar fiberizing pressure and flexure. To this end the rolls of the first pair are provided with large interfitting longitudinal ribs and grooves for flexing those long fibers which pass through the apparatus at right angles to the roll axis while the rolls of the second pair are provided with large interfitting circumferential ribs and grooves for flexing those long fibers which pass through the apparatus parallel to the roll axis. The rolls of certain of the remaining pairs are provided with relatively small interfitting longitudinal ribs and grooves for flexing the shorter fibers which pass through the apparatus at right angles to the roll axis while the rolls of the rest of the remaining pairs are provided with relatively small interfitting circumferential ribs and grooves for flexing the shorter fibers which pass through the apparatus parallel to the roll axis.

A further feature of this invention is in the provision of means for regulating the pressure exerted by the rolls of each pair to avoid injury to the asbestos fibers passing therebetween.

A still further feature of this invention is in the provision of a pair of universal-jointed drive shafts connected to each pair of rolls so as to maintain the rolls in constant parallel relation.

The foregoing and other features of the invention will be more readily understood from the following detailed description taken in connection with the accompanying drawings, in which—

Fig. 1 is a side elevation of an asbestos fiberizing apparatus designed in accordance with this invention.

Fig. 2 is a front elevation of the apparatus appearing in Fig. 1.

Fig. 3 is a sectional view through the interfitting ribbed portions of the first pair of longitudinally ribbed rolls.

Fig. 4 is a sectional view through the interfitting ribbed portions of the first pair of circumferentially ribbed rolls.

Fig. 5 is a sectional view through the interfitting ribbed portions of one of the remaining pairs of longitudinally ribbed rolls.

Fig. 6 is a sectional view through the interfitting ribbed portions of one of the remaining pairs of circumferentially ribbed rolls.

Fig. 7 is a sectional view taken along the line 7—7 of Fig. 2.

Referring more particularly to the drawings 5 designates a frame supported in upright position by base portions 6, said frame carrying a plurality of pairs of rolls indicated at A and B, C and D. 7 designates an upright support to which the driving mechanism hereinafter described is secured. A top plate or bar 8 is secured to frame 5 and support 7 to hold them in their relative vertical positions.

The rolls 9 and 10 of the pair A are provided with large parallel longitudinally extending ribs 11 defining large intervening longitudinal grooves 12; said ribs and grooves being transversely curved as shown in Fig. 3. The two rolls 9 and 10 are mounted to lie in the same horizontal plane with the ribs 11 of one roll fitted in the grooves 12 of the companion roll. To this end the roll 10 is journalled in stationary bearings 13 while roll 9 is journalled in sliding bearings 14 working in suitable bearing guides 15 secured to frame 5. Springs 16 are confined between the bearings 14 and suitable spring seats 17 and serve to yieldingly press the roll 9 against the roll 10. Adjusting screws 18 are threaded through a cap portion 19 of the bearing guides 15. These screws 18 bear against the spring seats 17 and are adjusted to regulate the compression of the springs 16. To prevent clogging of the grooves 12 rubber strip 42 is fitted in a recess 43 at the bottom of each groove. This rubber strip extends slightly beyond the contour of the groove 12. As the rolls rotate the strips 42 are compressed by the ribs 11. As the ribs leave the grooves the rubber strips, in expanding to their original condition, act as ejectors to clear the bottom of the grooves of the fibers that might otherwise remain therein.

The rolls 20 and 21 of the pair B are provided with large equi-spaced annular ribs 22 defining large intervening annular grooves 23; said ribs and grooves extending around the rolls at right angles to the axes thereof and being transversely curved as shown in Fig. 4. These rolls 20 and 21 are also mounted to lie in the same horizontal plane with the ribs 22 of one roll fitted in the grooves 23 of the companion roll. As here shown the mounting of the rolls 20 and 21 is the same as described in connection with the rolls 9 and 10. The roll 21 is journalled in stationary bearings 13 while roll 20 is journalled in slide bearings

14 working in bearing guides 15 secured to frame 5. The roll 20 is pressed toward roll 21 by springs 16 confined between bearings 14 and spring seat members 17, the compression of the springs being regulated by suitable adjusting screws 18 through cap portions 19. Rubber strips similar to those provided in the grooves of the rolls 9 and 10 may also be arranged in the grooves of the rolls 20 and 21 if this is found to be necessary or desirable. It will be noted that the rolls 20 and 21 of the pair B have been journalled in bearings and held in place by spring and seat members which are numbered the same as those bearings, spring and seat members mentioned in connection with rolls 9 and 10. The reason for the use of the same numbers is that the bearings, spring and seat members, etc., are identical in each and every set throughout the apparatus.

One end of a universally-jointed shaft 31 is secured to one end of the shaft of roll 9 as indicated at 32. The other end of the universally-jointed shaft 31 is mounted in a housing 33 secured to the support member 7 and is provided with a spur gear 34 adjacent thereto. This gear 34 meshes with a similar gear 35 fixed to a corresponding universally-jointed shaft 36 which is secured to one end of the companion roll 10. The universally-jointed shaft 36 is mounted in the same housing 33 in alignment with the universally-jointed shaft 31 and adjacent to the support member 7. Said shaft 36 extends beyond the housing and is provided at its outer end with a bevelled crown gear 37 meshing with a bevel pinion gear 38 mounted on a vertical shaft 39, which is rotatably driven by suitable power mechanism 40 mounted on top of the plate 8. Brackets 41 secured to support 7 hold the vertical shaft 39 in place.

It will thus be seen that the vertical power driven shaft 39 rotates the roll 10 through the universally-jointed shaft 36 in one direction and drives the roll 9 through the universally-jointed shaft 31 by the combination of the spur gears in the opposite direction. The object of providing the rolls 9 and 10 with universally-jointed drive shafts is to maintain the two rolls in constant parallel relation with one another.

The rolls 20 and 21 are connected to universally-jointed shafts 31 and 36 and the mechanical structure and operation is identical with the mechanical structure and operation of the rolls 9 and 10.

The rolls 9*a* and 10*a* of each set C are provided with relatively small parallel longitudinally extending ribs 11*a* defining relatively small intervening longitudinal grooves 12*a*; said ribs and grooves being transversely curved as shown in Fig. 5. These rolls 9*a* and 10*a* are likewise mounted to lie in the same horizontal plane with the ribs 11*a* of one roll fitted in the grooves 12*a* of the companion roll. The mounting of the rolls 9*a* and 10*a* is the same as described in connection with the rolls 9 and 10. The roll 10*a* is journalled in stationary bearings 13 while the roll 9*a* is journalled in sliding bearings 14 working in bearing guides 15 secured to frame 5. These rolls 9*a* and 10*a* are held together in exactly the same manner as heretofore described in connection with rolls 9 and 10 and rolls 20 and 21. To prevent clogging of the grooves 12*a* rubber strips 42*a* are fitted in recesses 43*a* at the bottom of the grooves 12*a* for the same purpose as described in connection with rolls 9 and 10.

The rolls 20*a* and 21*a* of each pair D are provided with relatively small equi-spaced annular ribs 22*a* defining relatively small intervening grooves 23*a*; said ribs and grooves extending around the rolls at right angles to the axes thereof and being transversely curved as shown in Fig. 6. These rolls 20*a* and 21*a* are also mounted to lie in the same horizontal plane with the ribs 22*a* of one roll fitted in the grooves 23*a* of the companion roll. The mounting of the rolls 20*a* and 21*a* is also the same as described in connection with rolls 9 and 10 and rolls 20 and 21.

The rolls of each pair C and D are connected to universally-jointed shafts 31 and 36 and the mechanical structure and operation is identical with the mechanical structure and operation of the rolls 9 and 10.

If desired deflector means 50 may be arranged between the several sets of rolls so that material passing through the nip of one set is guided toward the nip of the next lower set. These deflectors may be supported by the bearing guides or in any other convenient manner.

In the use of this apparatus a continuous stream of long and short asbestos strands is passed downwardly through the roll base of the first two roll sets A and B and subsequently through the roll base of the alternately arranged roll sets C and D, and is fiberized by pressure and flexure between the ribbed surfaces of opposing rolls. In this connection it will be appreciated that the vertically disposed long asbestos fibers are first subjected to the proper flexure between the horizontally disposed ribs 11 of rolls 9 and 10 while the long horizontally disposed fibers are subjected to similar flexure between the vertical ribs 22 of the rolls 20 and 21. By this combination of pressure and flexure it is possible to open the spicules of crude in a mass of long fibers without damaging the fibers which are already open.

The stream of asbestos strands continues downwardly through the roll base of the two roll sets C and D and the shorter fibers are subjected to similar flexure between these rolls in the same manner as the long fibers. Since the long fibers have already been subjected to proper flexure by the larger ribs 11 and 22, their passage through the rolls having the smaller ribs 11*a* and 22*a* will not result in damage to these fibers.

This apparatus is particularly advantageous to the fiberizing of long and short asbestos strands since the ribs and grooves of the rolls A and B are sufficiently large to enable the long strands to be flexed in a single corrugation while the shorter strands are taken care of in the same manner by the subsequent rolls. If the long asbestos strands were allowed to cover two or more corrugations in their initial flexure stage, the strands would be flexed in two or more directions at the same time. This would be too severe an action on these fibers and would result in damage to them. After they have once been flexed through the larger corrugations they may easily pass through the smaller corrugations of the subsequent set of rolls along with the smaller strands without damaging the fibers. Furthermore, the large corrugations of the rolls A and B bear down on more surface of the revolving roll and this has a tendency to increase the drag or pull on the fiber, thus causing it to enter between the rolls much more rapidly.

Having thus described my invention, what I claim is:

1. An asbestos fiberizing apparatus comprising a plurality of pairs of rolls aligned to act suc-

cessively on the asbestos during its passage through the apparatus, the companion rolls of one pair presenting large interfitting longitudinally extending ribs and grooves while the companion rolls of another pair present large interfitting circumferentially extending ribs and grooves, the rolls of certain of the remaining pairs presenting relatively small interfitting longitudinally extending ribs and grooves while the remaining pairs of rolls present relatively small interfitting circumferentially extending ribs and grooves.

2. An asbestos fiberizing apparatus comprising a plurality of pairs of rolls aligned to act successively on the asbestos during its passage through the apparatus, the companion rolls of the first pair presenting large interfitting longitudinally extending ribs and grooves while the companion rolls of the second pair present large interfitting circumferentially extending ribs and grooves, the rolls of certain of the remaining pairs presenting relatively small interfitting longitudinally extending ribs and grooves while the remaining pairs of rolls present relatively small interfitting circumferentially extending ribs and grooves.

3. Apparatus as set forth in claim 1 wherein one roll of each pair is yieldingly pressed toward the companion roll.

4. Apparatus as set forth in claim 1 in which the various pairs of rolls are spaced one above the other in vertical alignment.

5. An asbestos fiberizing apparatus comprising a plurality of pairs of rolls aligned to act successively on the asbestos during its passage through the apparatus, the companion rolls of one pair presenting large interfitting longitudinally extending ribs and grooves while the companion rolls of another pair present large interfitting circumferentially extending ribs and grooves, the rolls of certain of the remaining pairs presenting relatively small interfitting longitudinally extending ribs and grooves while the remaining pairs of rolls present relatively small interfitting circumferentially extending ribs and grooves, and driving means connected to each pair of rolls by universally-jointed shafts.

6. An asbestos fiberizing apparatus comprising a plurality of pairs of rolls aligned to act successively on the asbestos during its passage through the apparatus, the companion rolls of one pair presenting large interfitting longitudinally extending ribs and grooves while the companion rolls of another pair present large interfitting circumferentially extending ribs and grooves, the rolls of certain of the remaining pairs presenting relatively small interfitting longitudinally extending ribs and grooves while the remaining pairs of rolls present relatively small interfitting circumferentially extending ribs and grooves, and driving means connected to one roll of each pair by a universally-jointed shaft, said driving means transmitting synchronous rotation to the second roll of each pair by means mounted on a universally-jointed shaft connected to said second roll.

7. An apparatus as set forth in claim 6 in which certain of the rolls are provided with compressible groove cleaning elements located in the bottom portion of the grooves formed by the ribs of the rolls.

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