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METHOD AND APPARATUS FOR MANUFACTURING FRICTION LININGS

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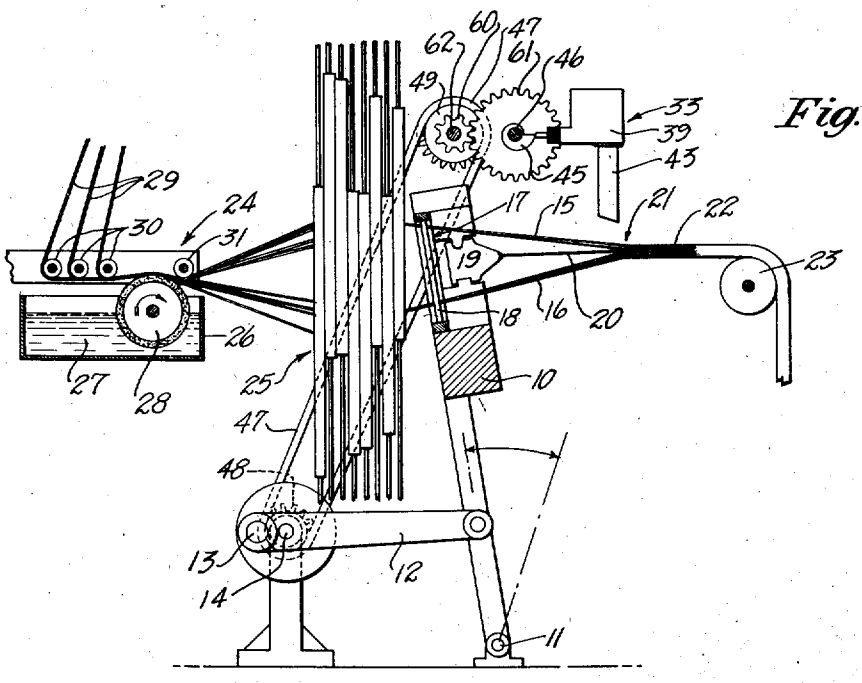
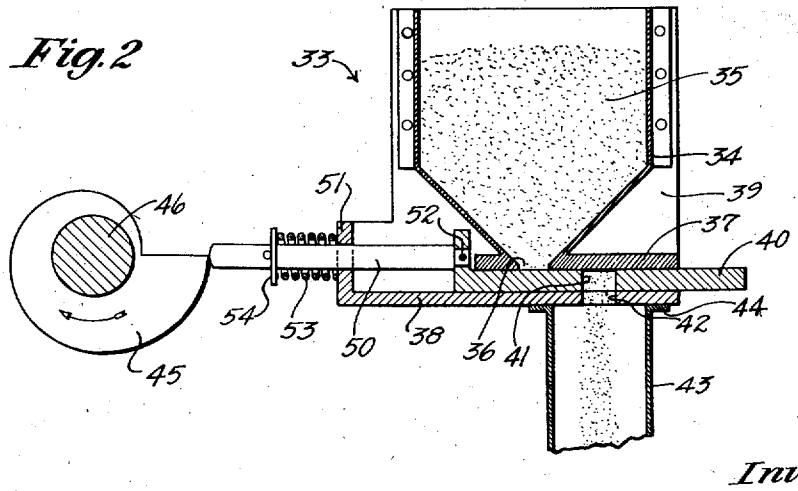


Fig. 1

Fig. 2



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METHOD AND APPARATUS FOR MANUFACTURING FRICTION LININGS

Donald W. Fether, Downey, Calif., assignor to Ensco Asbestos Company, Downey, Calif., a corporation of California

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9 Claims. (Cl. 139—36)

This invention deals generally with the manufacture of woven friction linings, for example brake and clutch linings, and has to do particularly with improved methods and apparatus for incorporating in woven friction linings, substances calculated to give to the lining certain desired frictional and other properties.

In the making and treatment of woven friction linings it is customary to impregnate or wet the yarns with liquid substances such as drying oils, coal tars and other oils commonly referred to as "friction compounds", for the purpose of obtaining the desired coefficient of friction between the lining and drum, and among other purposes to preserve the lining and retain its original flexibility. The practice has also been to incorporate in the lining finely divided solids such as graphite, silica, soft metals such as lead and zinc, or metallic compounds, the presence of such solids in the lining being desirable for the purpose of giving greater body to the lining and improving its frictional characteristics. The invention is concerned primarily with the incorporation of such liquid and solid substances in the lining, and particularly with a novel method and apparatus for depositing the pulverulent solid substance on the wetted yarns during the course of the weaving operation, in a manner such that the solids will be distributed uniformly within the woven lining.

In accordance with the invention, the yarns are first wetted with the drying oil at any suitable point in advance of the weave point, and the pulverulent solid material is incorporated in the fabric by being intermittently dropped upon the yarn substantially at the weave point and in timed relation with the weaving operation. It is important that the amount of solid material put into the lining be controlled within rather close limits, and that substantial excesses and deficiencies be avoided if the lining is to possess the desired frictional characteristics which the combination of the drying oil and solid material is intended to provide. Hence I have embodied in the invention means whereby a predetermined and accurately measured amount of the solid material is applied to the yarns in each intermittent operation so that not only is the proper proportioning of the material accurately maintained, but a uniform consistency in the pulverulent solid content of the woven lining is maintained throughout its length.

It is also desirable that the solid material be distributed throughout the cross section of several plies of the lining with uniformity, and to accomplish this purpose a predetermined relationship is maintained between the intervals at which the solid material is deposited on the yarn, and the positions of the yarns as controlled by the heddles. In the weaving operation, certain of the heddles shift after each run of the shuttle within the shed, to reverse the positions of some of the yarns in the warp courses. Instead of timing the application of the solid material to correspond with the frequency of the shuttle movements or successive shifts of the heddles, it has been found that best results are accomplished by delaying the successive applications of the solid material within intervals during which the yarns are shifted a plurality of times by the heddles. For example, good results have been obtained by timing the operation so that between each successive dropping of the solid material upon the yarns, the heddles will have reversed the yarns throughout one complete cycle and through the first movement of the next succeeding cycle, so that the successively applied amounts of solid material are deposited upon the normal successive combinations of yarns in the upper warp course. It is to be understood of course that the invention is not limited to any particular timed relation between the successive applications of the solid material and the operation of the heddles or relative positions of the yarns, although as stated, it is preferred that the intervals between successive deposits of the solid material be sufficiently extended to permit at least a plurality of shifting movements or reversals of the yarns.

The features of the invention referred to above, as well as various additional objects and details, will be understood to best advantage from the following description of a typical and illustrative form of the invention. In the description, reference is had to the accompanying drawing, in which:

Fig. 1 is a general diagrammatic side elevation illustrating a weaving mechanism embodying the invention; and

Fig. 2 is a fragmentary enlarged sectional view showing the pulverulent solid container and the intermittently operated measuring and dispensing apparatus in detail.

In Fig. 1 I have conventionally illustrated only those parts of the usual weaving mechanism that need be illustrated for a full understanding of the method and apparatus embodying the invention. The lay beam 10 pivotally mounted at 11 for oscillatory movement as indicated by the arrows, is shown to be driven by link 12 from an

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eccentric connection at 13 with a power driven shaft 14. The warp, consisting of upper and lower courses 15 and 16 of yarns, extends through opening 17 in the lay beam and through the reed 18. The lay beam carries the usual shuttle 19 which travels back and forth of the reed and carries the weft yarn 20. The warp courses 15 and 16 converge toward what may be termed, for convenience, the weave point at 21, and are there woven into the lining 22 which is advanced over a roller 23 and thence run to the usual winding reel, not shown.

As mentioned above, the yarns are primarily treated with a liquid friction compound or drying oil, and while the latter may be applied to the yarns at any suitable point along their travel, I have illustrated, as typical, a device at 24 whereby the yarns are wetted by the drying oil prior to their passage through the heddles 25. The apparatus 24 comprises a container 26 for the drying oil 27 within which a roller 28 is partially immersed. The yarns 29 being fed to the machine pass around guide rollers 30 and over the top surface of roller 28, thereby becoming coated with the drying oil. The yarns then pass beneath guide roll 31 and through the heddles 25. To those familiar with the art it will be understood that the heddles 25 are shifted vertically in predetermined sequence or combinations and that the yarns in the warp courses 15 and 16 are shifted from one course to the other in accordance with the movements of their respective heddles, the shuttle 19 traversing the shed between each shifting movement of the yarns.

The pulverulent solid material is intermittently dropped upon the yarn at substantially the weave point 21 by an apparatus generally indicated at 33 and shown in detail in Fig. 2. The apparatus 33 comprises a container 34 for the solid material 35 and having a bottom outlet 36 within a horizontally extending plate 37 supported above and in spaced relation to a bottom plate 38 having vertical end walls 39 between which the container 34 is supported. Between plates 37 and 38 is placed a horizontally shiftable plate 40 containing a measuring opening 41 of predetermined size adapted to register alternately with the container outlet 36 and an opening 42 in plate 38. A spout 43 secured at 44 to the underside of plate 38 extends downwardly to a point directly above the upper warp course 15, as shown in Fig. 1, and at the end of the shed where the yarns converge to the weave point 21.

Plate 40 is actuated in its lateral shifting movement by a cam 45 carried on shaft 46 driven by and in predetermined timed relation with the power shaft 14 by way of suitable connections, shown typically as including a chain 47 on sprockets 48 and 49, and gears 60, 61 keyed to shafts 62 and 46. The cam follower rod 50 extending through and opening in flange 51 is attached at 52 to the end of plate 40. Rod 50 is maintained in engagement with the cam by coil spring 53 bearing against a flange or washer 54.

In operation, rotation of the cam 45 in the direction of the arrow just beyond the position of Fig. 2, causes the plate 40 to be shifted by spring 53 to its extreme position toward the left, in which position the measuring opening or receptacle 41 is brought into registration with the container outlet 36 and is filled with the pulverulent solid material. As the cam 45 then rotates to the position shown in Fig. 2, plate 40 is shifted to the right, bringing opening 41 into registration with opening 42, whereupon the measured quantity of the solid material is dropped through the spout 43 upon the yarns at or just in advance of the weave point 21.

It will be understood that the relative speeds of shafts 14 and 46, and the particular design of cam 45 may be determined to cause the material to be discharged onto the yarns in any desired timed relation with the weaving operation, or with the movements of the heddles 25 and corresponding shifting of the yarns between the warp courses 15 and 16. As previously mentioned however, the timing of the operation of the dispensing apparatus 33 preferably is so adjusted that during the interval between successive discharges of the solid material, there will occur at least more than one, or a plurality of successive shifting movements of the yarns between the warp courses.

The drawing is to be regarded merely as illustrative of a typical and preferred embodiment of the invention, and it will be understood that various changes and modifications in the particular form shown may be made without departure from the invention when interpreted in its proper spirit and scope.

I claim:

1. Apparatus for making woven friction linings that includes, means for weaving upper and lower courses of yarns converging toward a weave point, a stationary container for supplying a pulverulent solid substance, and means for intermittently dropping by gravity alone, the pulverulent solid substance supplied from said container vertically upon the top surfaces of the yarns at substantially the weave point.

2. Apparatus for making woven friction linings that includes, means for weaving upper and lower courses of yarns converging toward a weave point, a stationary container for supplying a pulverulent solid substance, and means for intermittently dropping by gravity alone, the pulverulent solid substance supplied from said container vertically upon the top surfaces of the yarns at substantially the weave point and in predetermined timed relation with the weaving operation.

3. Apparatus for making woven friction linings that includes, means for weaving upper and lower courses of yarns converging toward a weave point, a container for supplying a pulverulent solid substance, and means fed from said container for measuring predetermined equal quantities of said substance and for intermittently dropping said measured quantities vertically upon the top surfaces of the yarns at substantially the weave point in timed relation with the weaving operation.

4. Apparatus for making woven friction linings that includes, means for weaving upper and lower courses of yarns converging toward a weave point, a stationary container for supplying a pulverulent solid substance, and cam operated means for intermittently dropping by gravity alone, measured quantities of the pulverulent solid substance supplied from said container vertically upon the top surfaces of the yarns at substantially the weave point.

5. Apparatus for making woven friction linings that includes, means for weaving upper and lower courses of yarns converging toward a weave point, a container for supplying a pulverulent solid substance, a measuring device receiving said

substance from the container, and means for intermittently actuating said measuring device to drop said substance vertically upon the top surfaces of the yarns.

6. Apparatus for making woven friction linings that includes, means for weaving upper and lower courses of yarns converging toward a weave point, a container for supplying a pulverulent solid substance, a measuring device receiving said substance from the container, and means for intermittently actuating said measuring device in predetermined timed relation with the operation of said weaving means to drop said substance vertically upon the top surfaces of the yarns.

7. Apparatus for making woven friction linings that includes, means for weaving upper and lower courses of yarns converging toward a weave point, a container for supplying a pulverulent solid substance, a measuring device receiving said substance from the container, a spout extending downwardly from said measuring device to a point directly above said yarns, and means for intermittently actuating said measuring device to discharge said substance into the spout and vertically upon the top surfaces of the yarns.

8. Apparatus for making woven friction linings that includes, means for weaving upper and lower courses of yarns converging toward a weave point, a stationary container for supplying a pulverulent solid substance, a spout extending downwardly below said container to a point directly above said yarns, and means movable intermittently with relation to said container and spout for intermittently discharging said substance from the container into said spout and vertically upon the top surfaces of the yarns.

9. Apparatus for making woven friction linings that includes, means for weaving upper and lower courses of yarns converging toward a weave point, a container for supplying a pulverulent solid substance, a spout extending downwardly below said container to a point directly above said yarns, and means including a measuring receptacle, for intermittently discharging said substance from the container into said spout and vertically upon the top surfaces of the yarns.

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CERTIFICATE OF CORRECTION.

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It is hereby certified that the name of the assignee in the above numbered patent was erroneously written and printed as "Ensco Asbestos Company" whereas said name should have been written and printed as Emsco Asbestos Company, of Downey, California, a corporation of California; as shown by the records of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of August, A. D. 1937.

Leslie Frazer

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6. Apparatus for making woven friction linings that includes, means for weaving upper and lower courses of yarns converging toward a weave point, a container for supplying a pulverulent solid substance, a measuring device receiving said substance from the container, and means for intermittently actuating said measuring device in predetermined timed relation with the operation of said weaving means to drop said substance vertically upon the top surfaces of the yarns.

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