Aug. 10, 1954 E. R. FREDERICK 2,685,910

MACHINE FOR CORRUGATING FIBROUS WEBS

Filed Oct. 29, 1952

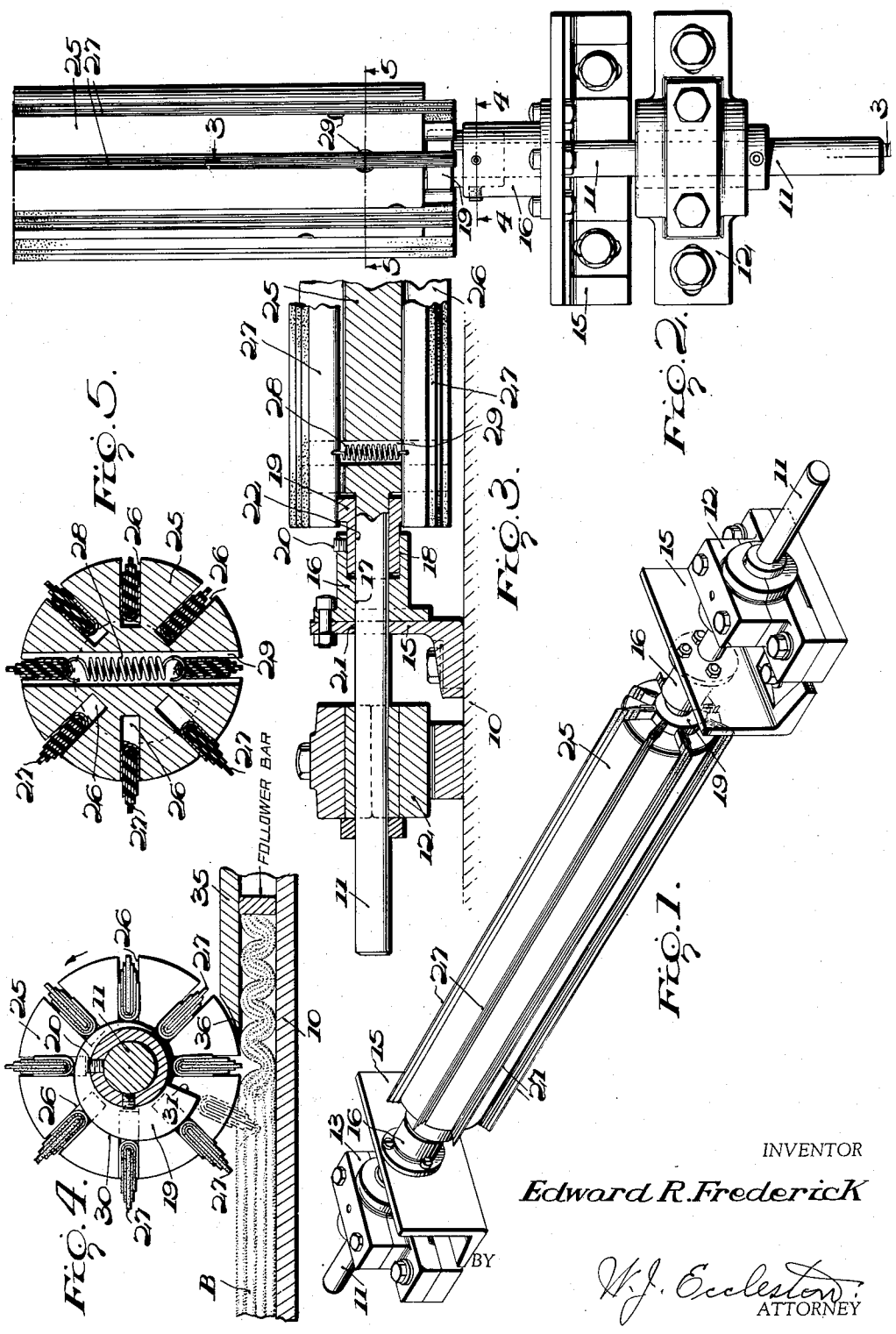


Fig. 2.

Fig. 3.

Fig. 5.

Fig. 1.

Fig. 4.

INVENTOR

Edward R. Frederick

BY

W. J. Eccleston

ATTORNEY

Patented Aug. 10, 1954 2,685,910

UNITED STATES PATENT OFFICE

2,685,910

MACHINE FOR CORRUGATING FIBROUS WEBS

Edward R. Frederick, Pittsburgh, Pa., assignor to the United States of America as represented by the Secretary of the Army

Application October 29, 1952, Serial No. 317,441

10 Claims. (Cl. 154—30)

1

This invention relates to machines for corrugating fibrous webs. The machine of the invention is partly disclosed but not claimed in the pending joint application of Michael C. Jaskowski and myself, Serial No. 167,614, filed June 12, 1950, entitled "Corrugated Fibrous Battings and Method."

The principal object of the present invention is to provide a machine of simple construction which will automatically form corrugations in wool and other fibrous webs or batts. The corrugated wool batts formed by the machine, when subjected to further processing as explained in said pending application, provide fibrous fillers desirable for cold climate garment fillers, being sufficiently durable to withstand extended service without substantial deterioration due to flexure or compression. The advantages of products of the machine are explained in said pending application and need not be elaborated here.

Another object is to provide a machine which is easily adjusted or modified to handle different webs or batts and to make corrugations of various depths and widths therein. Other objects of the invention will be apparent from the following description of the preferred embodiment of the invention which is shown in the accompanying drawings forming a part of this specification.

In said drawings,

Fig. 1 is a perspective view of the working parts of the machine;

Fig. 2 is a fragmentary plan view of the same, on a large scale;

Fig. 3 is a fragmentary vertical section, on line 3—3 of Fig. 2 and on the same scale;

Fig. 4 is an enlarged cross section on line 4—4 of Fig. 2 showing in addition a batting and a support or table; and

Fig. 5 is a cross section on line 5—5 of Fig. 2, on the scale of Fig. 4.

Referring particularly to the drawings, the illustrative machine is supported on top of a table 10 or the like and has a drive shaft 11 rotatable in two aligned bearings or pillow blocks 12, 13 fixed to the table. The means for driving shaft 11 may be a motor-driven belt and pulley (not shown) or any other convenient source of power. Also fixed to the top of the table are a pair of cam supports each consisting of an upright angle bar 15 bolted to the table and a horizontal sleeve bearing 16 bolted to the angle bar 15, said sleeve bearing being provided with a central bore 17 loosely receiving the shaft and a counterbore 18 receiving a cam 19. A set screw 20 secures each cam 19 against rotation in the counterbore. If

2

preferred, counterbore 18 may be superseded by a recess of polygonal cross section in which a complementally-shaped cam will fit, thereby obviating rotation. The angle bars 15 each have a bore 21 through which the shaft passes, while each cam has a central bore 22 aligned with bores 17 and 21, so that the shaft extends through and is rotatable in angle bars 15, sleeve bearings 16 and cams 19, as well as the pillow blocks 12, 13.

Fixed to and preferably integral with shaft 11 is a cylindrical roll 25 having radial, equally spaced slots 26 extending throughout its length, eight slots being shown in the illustrative embodiment. Received in each slot is a blade 27 having a flexible lip at its outer edge and a stiff metal body at its inner edge. Windshield wiper blades may be used, especially if slightly modified to withstand rubbing contact with the cams as will be explained. Coil tension springs 28 are housed in cross or diametral bores 29 in the roll and are attached at each end to the inner edge of a windshield wiper blade; each spring being at such tension as to hold the two blades to which it is attached within the corresponding housing slots 26. Thus all the blades are constantly pulled inwardly radially so that their inner metallic edges contact the peripheries of stationary cams 19 at all times. As shown in Fig. 4, the cams 19 have spiral edges 30 and have a lift or "throw" proportioned to the height or depth of the corrugations to be formed by the blades. At the end of each spiral edge there is a radial cam surface 31 which permits the blades to retract suddenly within their respective slots under the pull of springs 28 at the desired moment of the cycle of operation. Obviously the angular positions of the cams may be changed, which will modify the cycle of the blades. Thus in Fig. 4 the blades are shown retracted before reaching the vertical position at the bottom of the roll; by shifting the cams slightly, the blades may be retracted later, for example. This adjustment is desirable for accommodating the machine to different operating conditions. Also the illustrated cams may be superseded by cams having a greater or less "throw."

In one form of the invention the outer flexible edges of the blades were about ¾ in. apart, measured circumferentially, to form corrugations about ⅜ in. in height; for higher corrugations, greater spacing of the outer blade edges is required. A top plate 35, preferably a flat plate of "Plexiglas" or metal, is supported parallel to table 10 on the discharge side of the machine, preferably by means of a frame (not shown) and

will be spaced about 3/8 in. above the top of the table if corrugations of about 3/8 in. height are desired. The end 36 of plate 35 is beveled and is set very close to the periphery of the roll to make certain the web or batt will pass under the plate and not be carried around the roll. The blades can not strike the beveled plate end 36 because they are retracted by springs 28 due to the location of radial cam surfaces 31. A follower bar (as shown) may be slidable on the table top and may be pushed under plate 35 by the corrugated batt as it is formed and moved along the table, thus offering resistance to the batt and effecting compacting of the corrugations.

As the batt B (shown as four plies or webs) is fed from the doffer of the carding machine (not shown), toward the machine of the invention, the batt is picked up by the nearest blade 27 (which is projected) and is moved along under the machine. The edge of the blade presses firmly into the batt. When the blade is withdrawn in its slot, the formed corrugation passes under the top plate 35 where it is retained by friction until moved along by the succeeding corrugations. The corrugated portion of the batt provides the resistance which is essential to buckle the batt to form the individual corrugations. Initially, that is before there is a corrugated batt end to provide the necessary resistance, a follower bar (as shown) is placed on the forward end of the batt beyond the corrugator, and said bar is pushed along until it reaches the end of the frame on the table, when it may be removed. For each revolution of the roll six inches (8 x 3/4") of the batt is corrugated; hence if the batt is fed to the corrugator at about 48 F. P. M., the roll must be rotated about 96 R. P. M. To prevent the fibers from adhering to the blades and/or slots, it has been found desirable, and at times necessary, to vibrate the roll end of the top plate 35 vertically through an arc of about 1/4 in. at a frequency of about 120 vibrations per minute. Obviously several well known mechanisms may be used to effect such vibration. In lieu of the follower bar mentioned above, experiments show that a canvas (or similar rough surfaced) belt fixed to the table top to serve as a flat base plate and extending from the roll part way to the end of said frame will offer sufficient frictional resistance to cause a wool batt to buckle and form corrugations without adherence to the blades and/or slots. This canvas belt will be understood without illustration.

The described apparatus has worked perfectly on carded cotton, nylon and wool, and doubtless will work on other textile batts of natural, synthetic and semi-synthetic fibers and fiber mixtures.

What I claim is:

1. A machine for corrugating loose batts of fibrous material comprising a power-driven cylindrical roll; means supporting the roll for rotation about a horizontal axis; plural batt-corrugating means carried on and extending lengthwise of the roll and having relatively soft outer edges extendable beyond the periphery of the roll and retractible within the confines of the roll; means associated with the roll to effect automatic extension and retraction of said batt-corrugating means as the roll rotates; and fixed flat batt-supporting means supporting the batt as it approaches the roll, as it passes under said roll, and as it is moved away therefrom in a corrugated condition, said batt-supporting means providing an anvil against which the batt-corrugating means work.

2. The invention defined in claim 1, wherein fixed means is provided with an edge so located as to prevent the corrugated batt from clinging to and moving around with the rotating roll, said fixed means also confining the corrugated batt as it moves over the fixed batt-supporting means away from the roll.

3. A machine for corrugating loose batts of fibrous material comprising a power-driven roll; means supporting the roll for rotation; said roll having a plurality of longitudinally extending radial slots; a plurality of batt-corrugating member each having a relatively soft outer edge and each of which is movable radially in one of said slots; means associated with the roll to effect automatic projection of said corrugating members beyond the periphery of the roll and then retraction of said corrugating members as the roll rotates; and fixed batt-supporting means supporting the batt as it approaches the roll, as it passes under the roll, and as it moves away therefrom in a corrugated condition, said batt-supporting means providing an anvil against which the batt-corrugating members work.

4. A machine for corrugating loose batts of fibrous material comprising a power-driven roll; means supporting the roll for rotation; said roll having a plurality of longitudinally extending radial slots; a plurality of corrugating members each having a relatively soft outer edge and each of which is movable radially in one of said slots; fixed cams associated with the roll and operating said corrugating members to project them beyond the periphery of the roll; spring means to retract the corrugating members during each rotation of the roll; and fixed batt-supporting means supporting the batt as it approaches the roll, as it passes under the roll, and as it moves away therefrom in a corrugated condition, said batt-supporting means providing an anvil against which the batt-corrugating members work.

5. The invention defined in claim 4, wherein the machine is provided with a fixed flat plate extending parallel to the fixed batt-supporting means and spaced therefrom such a distance that the tops of the corrugations contact the under surface of the plate as the corrugated batt moves away from the roll, said plate having a beveled edge very close to the periphery of the roll to prevent the batt from clinging to the rotating roll, said spring means retracting the corrugating members so that they do not strike the beveled edge of the plate.

6. A machine for corrugating loose batts of fibrous material comprising a power-driven roll; means supporting the roll for rotation; said roll having a plurality of longitudinally extending radial slots; a plurality of blades received individually in said slots, each blade having a relatively soft batt-contacting lip at its outer edge and each being movable radially in its slot so that its lip projects beyond the periphery of the roll during each rotation of the roll; cam means associated with the roll to effect projection of the blade edges; spring means associated with the roll to effect retraction of the several blades in co-operation with said cam means during each rotation of the roll; and fixed batt-supporting means supporting the batt as it approaches the roll, as it passes under the roll, and as it is moved away therefrom in a corrugated condition, said batt-supporting means pro-

viding an anvil against which the batt-corrugating means works.

7. The invention defined in claim 6, wherein the blades each include metallic parts which continuously contact the cam means, and a flexible resilient projecting lip of rubber-like material which contacts the batt with its outer edge.

8. The invention defined in claim 6, wherein there are an even number of slots in the roll arranged at regular intervals so that the blades are in diametrically opposite pairs, and the spring means are coil springs housed in diametric bores in the roll, each coil spring being under tension and connected at opposite ends to two diametrically opposite blades.

9. The invention defined in claim 6, wherein the cam means project within the ends of the roll; and cam-supporting means hold the cams normally immovable, said cams and cam-supporting means being constructed and arranged

so that each cam may be turned angularly relative to the axis of rotation of the roll and then fixed, thereby to vary the time or cycle of movement of the blades in and out of their slots.

10. The invention defined in claim 6, wherein the fixed batt-supporting means is a flat table top and there is a flat plate held spaced above the table top to confine the corrugated batt as it moves away from the roll, said flat plate having a beveled edge adjacent the roll so as to prevent the batt from traveling around with the roll after corrugation.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,617,018	Federhart	Feb. 8, 1927
1,989,293	Sandberg	Jan. 29, 1935
2,514,801	Sapp	July 11, 1950
2,553,017	Sterner	May 15, 1951