April 29, 1941. C. FIELD ET AL 2,240,135

METHOD OF FORMING AND IMPREGNATING FIBROUS PADS

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FIG. 1.

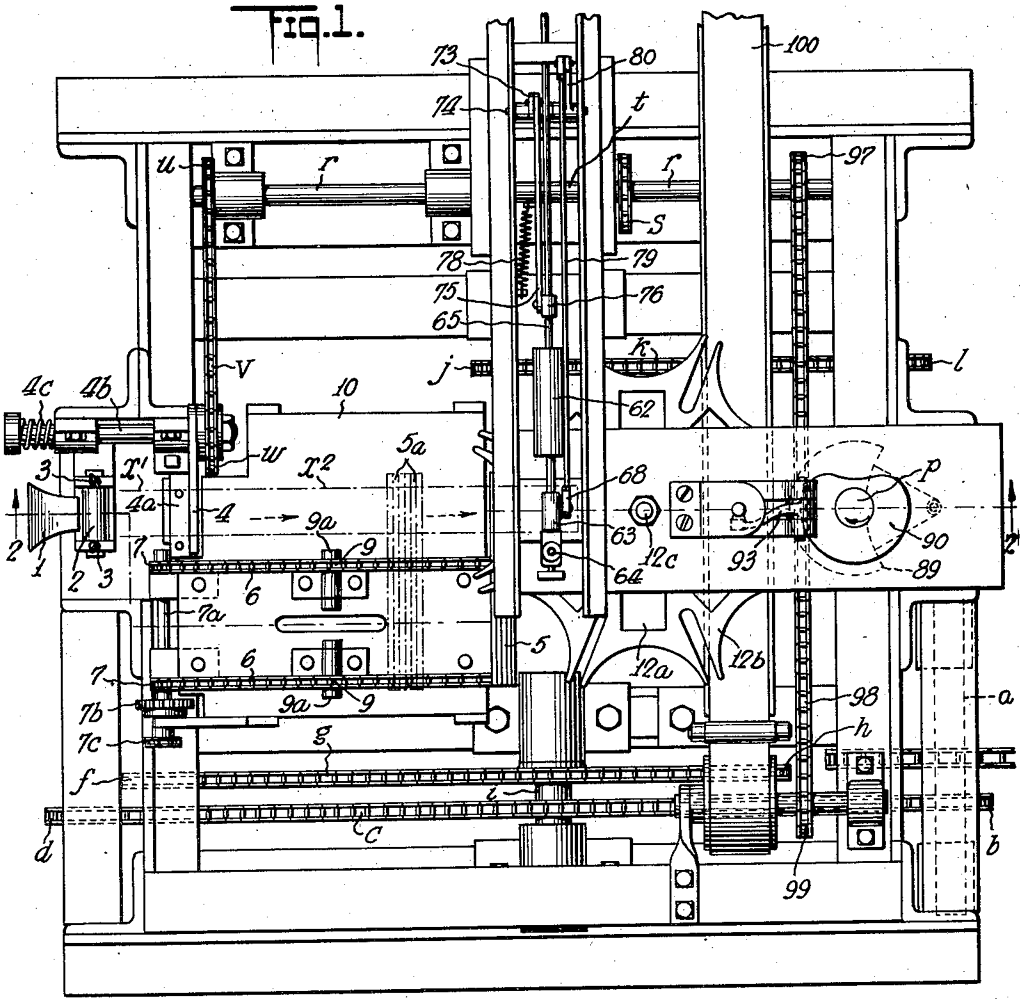


FIG. 8.

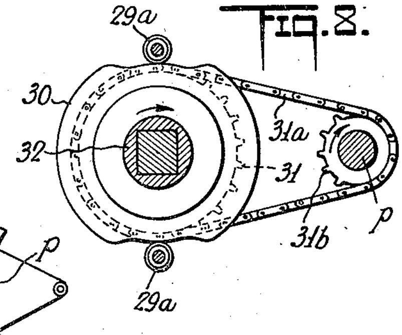
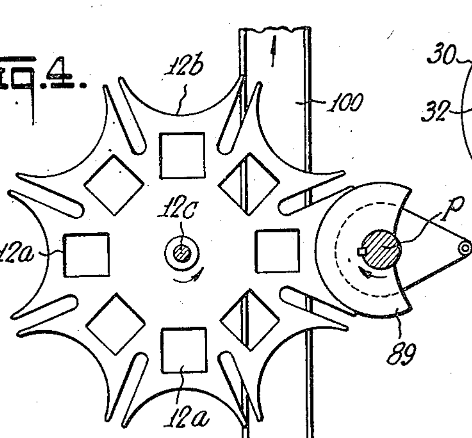


FIG. 4.



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METHOD OF FORMING AND IMPREGNATING FIBROUS PADS

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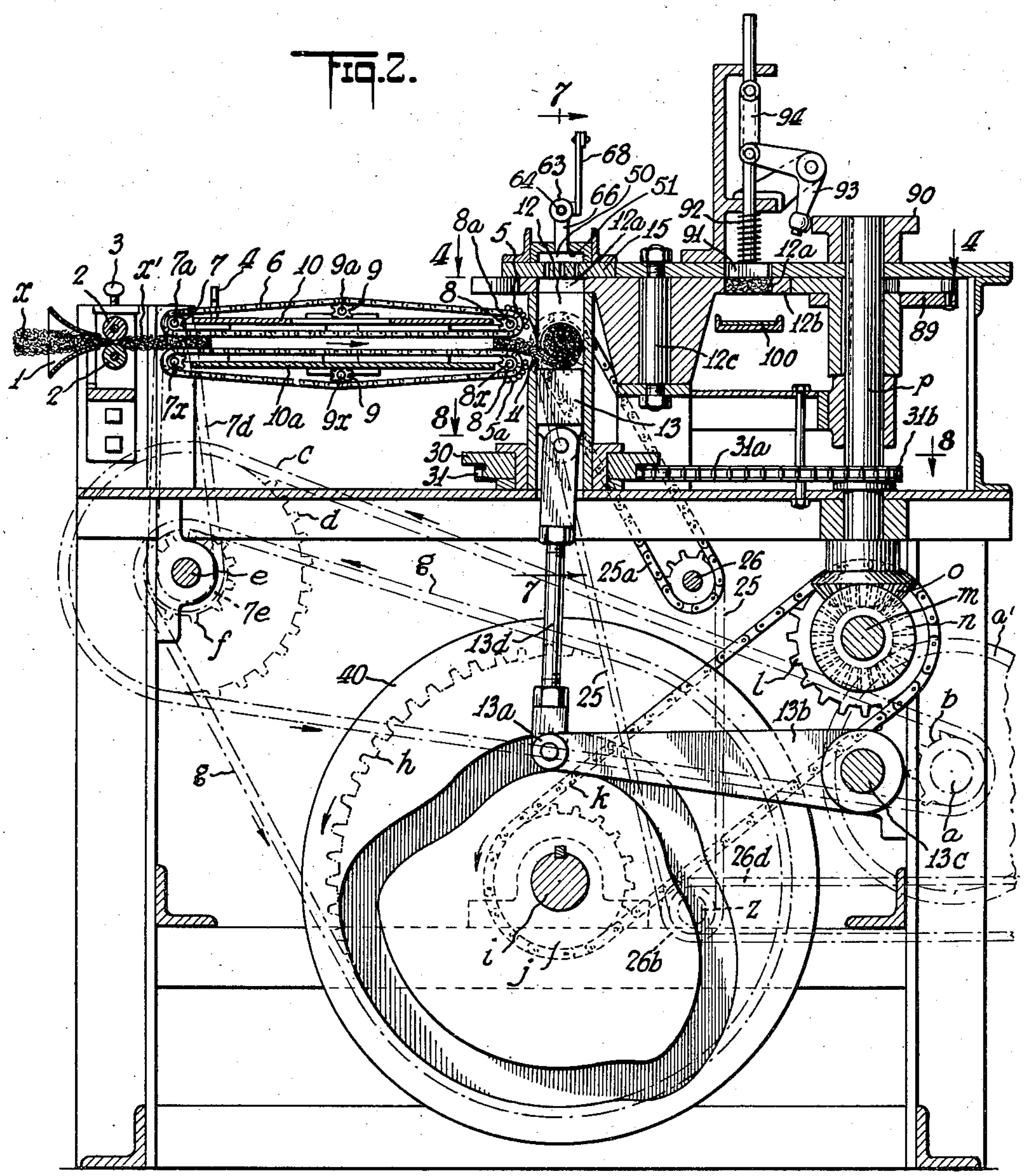
FIG. 2.



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METHOD OF FORMING AND IMPREGNATING FIBROUS PADS

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FIG. 3.

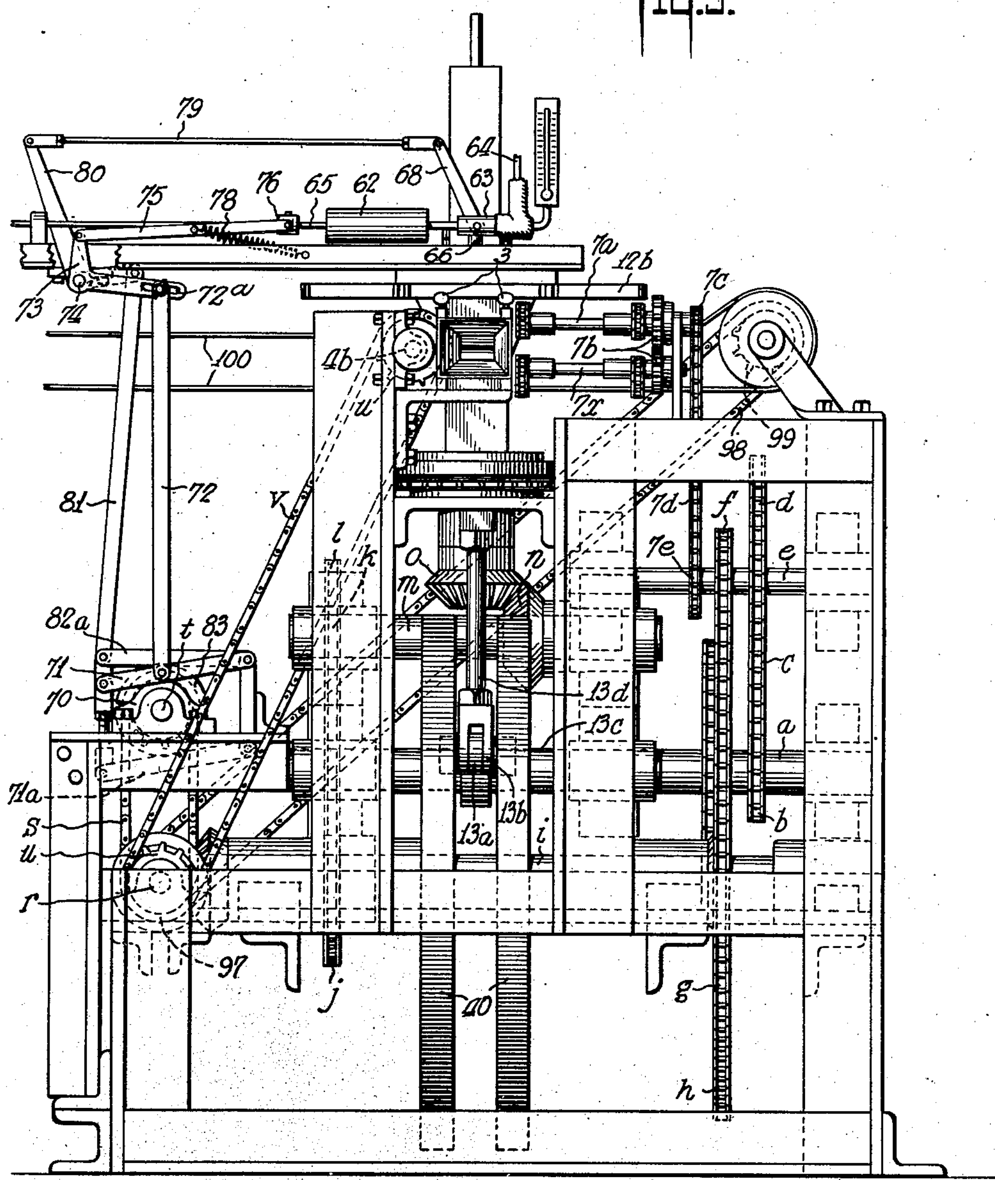
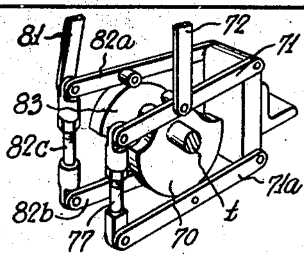


FIG. 7a



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METHOD OF FORMING AND IMPREGNATING FIBROUS PADS

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FIG. 7.

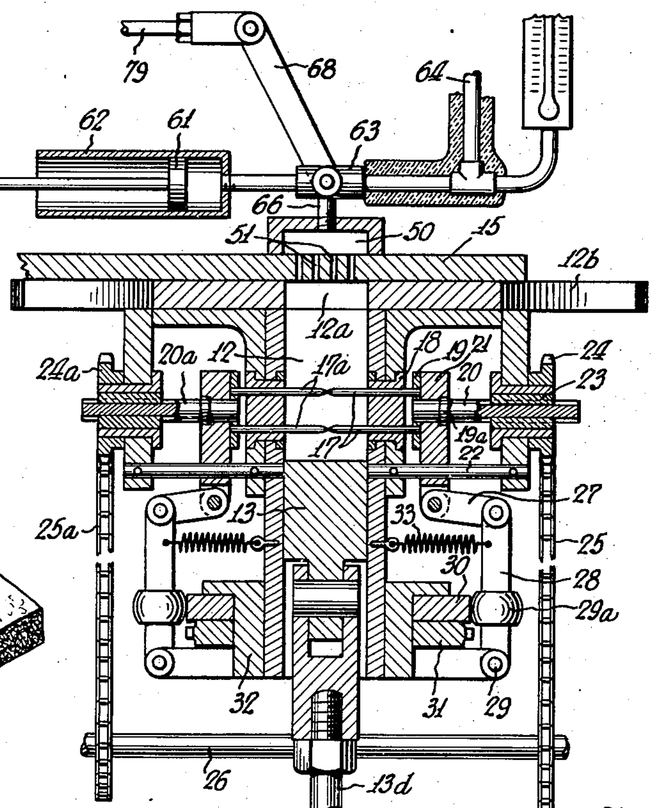


FIG. 9.

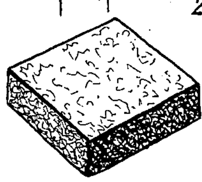


FIG. 5.

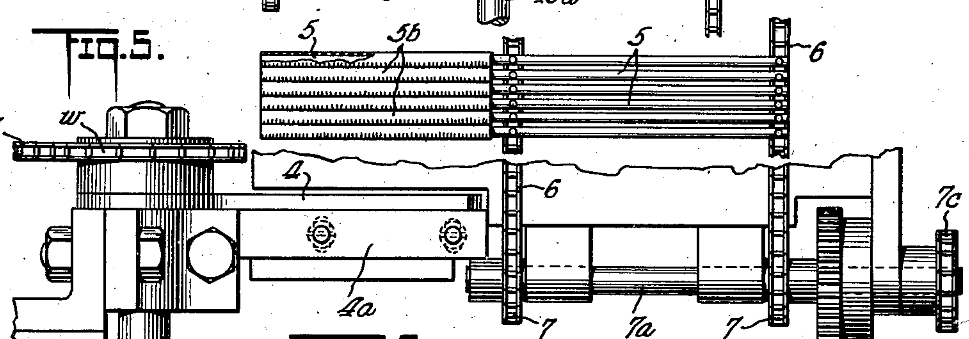
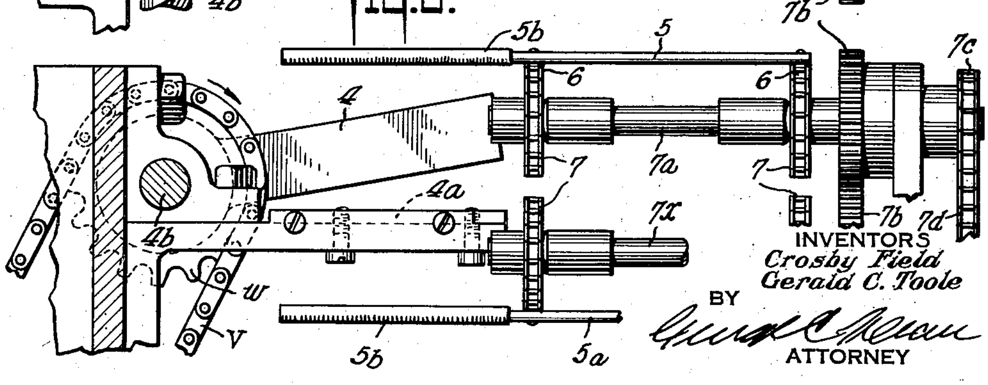


FIG. 6.



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Patented Apr. 29, 1941

2,240,135

UNITED STATES PATENT OFFICE

2,240,135

METHOD OF FORMING AND IMPREGNATING FIBROUS PADS

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Application December 27, 1938, Serial No. 247,762

12 Claims. (Cl. 252—91)

The present invention is herein disclosed as applied to specific cases while the materials and apparatus are primarily designed for making steel wool pads, and for impregnating them with soap; but various features of the method, and also of the apparatus, may be useful as applied to specifically different materials, or purposes.

Specifically considered, the method includes making the pads from metal wool, usually steel wool, preferably in the form of a continuous strip comprising a large number of long, curly, springy fibers. Steel wool fibers as blown off from a predetermined number of adjacent knives of wool cutting machines of the type disclosed in Field Patent No. 1,608,481, readily form fluffy springy strips suitable for our purposes. Under normal conditions, or under predetermined applied tension, equal lengths of such a strip will contain the same amount of wool.

According to the present invention, feed mechanism pulls the strip material into the machine intermittently, each pull measuring off the same length of strip, each strip containing sufficient wool for one pad.

Each length is cut off, and the feed mechanism pushes the leading end of the strip into a forming chamber, and then completely releases it. The cross-section of this forming chamber is preferably the same as the larger-area dimensions of the pad.

After the leading end of the strip has been pushed into said chamber, opposite, continuously-rotating spinning needles, are forced into said leading end. These needles are axially aligned and rotate in planes parallel with the direction of the feed-in, so that the untensioned, leading and trailing portions of the fluffy strip, are wound in a few fluffy layers, the volume of which may be four or five times the volume of the pad to be made therefrom.

On each spinner there are preferably two needles, located eccentrically to their axis of rotation, so that the interior consists mostly of the leading end of the strip; and, the exterior layers as wound on the outside of said needles, tend toward elliptical; but when the needles are withdrawn, the outer layers become cylindrical. This cylindrical structure and its fluffiness are important as concerns uniformity of distribution of the wool, when the relatively large diameter cylinder is flattened to form a relatively thin pad.

While the above steps of the method are important merely as concerns making standard-size pads, an important feature of my method is an intermediate step, which includes discharging a measured amount of soap of predetermined fluid temperature upon said fluffy cylindrical mass of the metal wool; preferably downward, so that distribution of the fluid soap in the fluffy mass, is assisted by gravity.

The chamber in which the fluffy cylinder of wool is formed and impregnated, is preferably the interior of a compressor, the bottom of the chamber being the compressing piston, and the top being the pad-shaping mold into which the relatively voluminous mass is compressed by the piston. Preferably the top or end-closing wall of this mold is formed with passages through which the fluid soap is ejected downward into the cylindrical mass, just after the up-moving piston has closed the lateral inlet, but before it has applied any substantial compression. These passages are preferably of relatively small cross-section and are distributed over a considerable area of the top end of the mold, so as to properly distribute the soap. As explained below, distribution of the soap may be assisted by beginning its discharge before friction, or compression, has completely stopped rotation of the cylindrical wool; and, in any event, the high pressure applied in flattening the pad, is highly effective for distribution of the soap throughout the thickness of the pad.

This upper end wall of the mold could be made removable, and the piston given an additional vertical movement for ejecting the pad, but there are special advantages in making this end wall a stationary plate, permanently connected with, and forming the bottom of the soap supplying chamber. This requires making the side walls of the mold, slidable edgewise, into and out of registry with the compressor. In the form of apparatus shown such edgewise movement of the mold frame is effectively provided for by having a series of mold frame holes formed in a rotary plate which is mounted on an axis parallel with the compressor, and provided with indexing mechanism whereby successive mold frame holes may be moved into operative registry with the compressor to receive and shape a pad, and then carry it to a position in registry with an ejector, whereby the formed pad is ejected from the frame, preferably downward, so that the pad falls on a conveyer which carries it to a point suitable for other operations, as for instance drying, cooling or packaging the pads.

The above and other features of our apparatus, as well as of our method, will be more clearly understood from the following description in connection with the accompanying drawings, in which

Fig. 1 is a top plan view;

Fig. 2 is a vertical section on the line 2—2, Fig. 1;

Fig. 3 is an end elevation viewed from the left of Figs. 1 and 2;

Fig. 4 is a detail plan view of the mold frame rotor and a Geneva cam drive and stop mechanism in operative relation thereto;

Figs. 5 and 6 are detail views on a large scale, showing the strip-gripping feed-in mechanism, in its relation to the knife for cutting off the rear end of the tensioned and measured strip of metal wool; Fig. 5 being a plan view; and Fig. 6 being a front end view of the parts as shown in Fig. 5;

Fig. 7 is a vertical section on the line 7—7, Fig. 2, showing the compressor, spinning needles, operating mechanism therefor and the soap supplying means at the upper end thereof;

Fig. 7a is a detail perspective showing the cams and levers for actuating the valve and piston of the soap pump;

Fig. 8 is a plan view showing the cams and driving mechanism for controlling simultaneous inward and outward movements of the continuously spinning needles; and

Fig. 9 is a perspective view of a square soap and metal wool pad which will be formed when the cross-sectional shape of the compressor chamber and mold is a square.

Referring to these drawings, it will be seen that while various of the above described steps of our method could be performed by hand, and some of them could be omitted, a very important part of the invention is the apparatus, which is a complete machine organized so that all of the steps are automatically formed, in proper succession on each pad; and some of the operations are being simultaneously performed on successive pads.

Referring to Fig. 2, supplemented by Figs. 1 and 3, it will be seen that the fluffy longitudinally elastic strip material x enters the machine through a rectangular funnel 1, in alignment with a pair of idler rolls 2, one of which is vertically adjustable by screws 3.

As shown in Fig. 2, the leading end of the ribbon x^1 is in the plane of the rotary knife 4, and rests on stationary shear 4a. See Figs. 5 and 6.

Traction on the ribbon is applied by two sets of fingers 5, 5a, the fingers of one set 5 being attached crosswise to, and projecting laterally from, two sets of parallel chains 6, 6, which are similar, and are supported and caused to rotate at the same speed by three pairs of sprockets, namely, sprockets 7, 7, on shaft 7a at the feed-in end; 8, 8, on shaft 8a at the delivery end of the feed; and 9, 9, intermediate. The latter are on separate shafts 9a, 9a, which are each vertically adjustable, as by shims, for the purpose of taking up slack. The fingers of the cooperating set, 5a, are carried by precisely similar, symmetrically opposite pairs of chains, and sprockets, on shafts 7x, 8x, and 9x respectively.

As shown more clearly in Fig. 3, the sprocket shafts 7a, 7x are caused to rotate equally and oppositely by 1 to 1 gears 7b, 7b. Shaft 7a is driven through sprocket 7c, chain 7d, and sprocket 7e, on shaft e, Fig. 2; and shaft 7x is driven from 7a, through said gears 7b. All the other feed chain sprockets are idlers, driven through said feed chains.

Each set of fingers 5, 5a, consists of several fingers in series, and preferably the laterally-projecting wool-engaging portions of these fingers are each covered by rubber tube as 5b, Figs. 5 and 6. As will be obvious, the chains cause these fingers to travel in the direction of the arrows Fig. 2. They successively engage the ribbon x^1, in the rear of its leading end and pull it endwise between upper and lower plates 10, 10a, of an open ended, box-like passage; and then push said leading end through opening 11 in the side of a vertical compressor chamber 12. The opposite fingers separate successively, the last pair, leaving the ribbon entirely free. In a special case, with 6-tooth sprockets, half inch links, fingers on 6 links, and with the initial finger-engagement an inch or so in rear of the leading end, about 2½ inches of the ribbon may be pushed into a 2⅜ inch compressor chamber.

Before this happens, however, and while the ribbon is still being pulled through passage 10, 10a, against tensioning resistance of idler rolls 2, the knife 4 cuts off the measured length of tensioned ribbon, x^2, thereby freeing it from tension. This knife is rigidly mounted on rotating shaft 4b, and its rotation is timed so that it passes the stationary shear 4a when the proper length shall have been measured off; thus leaving a leading end of ribbon x^1 resting on said stationary shear, as described above.

The bottom of the chamber 12, is the retracted compressor piston 13, and the top is the stationary plate 15, against which the piston compresses the metal wool to form the pad.

The piston is in the lowermost position while the sets of fingers have been pushing the leading end of the ribbon into the compressor and have released the ribbon, leaving it entirely free. While the piston is still in this lowermost position, pairs of rapidly spinning needles 17, 17a, are projected endwise into the box and into engagement with the leading end of the ribbon therein. These needles are eccentrically located with respect to the axes of shafts 20, 20a, by which they are rotated. Being rapidly revolved in planes parallel with the length of the ribbon; and the cut-off length of ribbon being free, the needles quickly wind it up into cylindrical form. Thereupon the needles are withdrawn, leaving the loosely rolled cylinder of metal wool free, within the compressor chamber.

The lateral stresses applied on the needles in winding the free ribbon are very small, and means for giving them their endwise and rotary movements may be correspondingly simple. As shown in Fig. 7, the needles are similarly and symmetrically arranged, as also the means for giving each pair the required movements. The needles 17 are endwise slidable in a rotary bushing or journal 18, which is rotatably mounted in the wall of the compressor chamber, flush with the inner surface thereof. The needles are rigidly secured in a disc 19 which is secured to and rotated by shaft 20. Said shaft is rotatable in slidable block 21, which is keyed against rotation by slidable engagement with a parallel stationary guide-bar 22. The non-rotating slidable block 21, imparts forward movement to the spinner by rotary bearing against disc 19; and retracting movement by bearing on collar 19a which is secured on shaft 20. Said shaft 20 is slidably splined in a bushing or journal 23, which is rotatably mounted in the frame of the machine as shown, and which is driven through sprocket 24 by chain 25.

An intermediate portion of chain 25 engages a sprocket on countershaft 26. This latter sprocket is of the same diameter as sprocket 24, consequently shaft 26 rotates at the same rate as needle shaft 20. At the other end, similar sprocket drives chain 25a which drives a sprocket 24a precisely similar and symmetrical with respect to sprocket 24; and all the movements of the needles, 17a, with respect to this sprocket, and the means permitting them are the same but symmetrically opposite to those for needles 17; except, of course, both sets of needles revolve in the same direction. Therefore, the means for projecting the pairs of needles endwise into the compressor chamber and withdrawing them therefrom will be specifically described in connection with needles 17. As shown (Fig. 7) the block 21 is connected by link 27, to lever 28, which is pivotally anchored at 29 and which has intermediate its length a roller 29a bearing on cam 30 which is rotated by sprocket 31 on stationary journal 32. The lever 28, is tensioned by spring 33 so that the needles 17 will be projected into the compressor by spring pressure upon block 21; and the cam 30, as shown in Fig. 8, is formed with symmetrically located cam depressions which permit the springs to thrust the needle into the position shown in Fig. 7. The cam 30 also has symmetrical concentric cam projections which hold the needles in the withdrawn position. The depressions extend through relatively short arcs, so the needles operate for relative short periods. This is permissible because they rotate at high speed, on a free untensioned length of the fluffy wool.

Fig. 2 shows that chain 25 which drives the spinning needles, is itself driven through sprocket 26b, on shaft z, which is driven by chain 28d, which is driven from a sprocket on the shaft of a motor not shown, but which as noted below is preferably the same electric motor that drives the compressor and spinner-shifting mechanism.

The spinner-shifting cam 30 is synchronized with all other parts of the machine, the sprocket wheel 31 which rotates it being driven through chain 31a, sprocket 31b, shaft p, bevel gears o, n, shaft m, sprocket l, chain k and sprocket j which is keyed to central shaft i, carrying the cam which operates the compressor. Thus the in and out reciprocations of the needles are timed accurately with respect to the movements of the plunger. The depressions and projections of cam 30, being symmetrical, as shown in Fig. 8, only half a revolution of the cam is required to feed one in and out cycle of endwise movement of the spinning needle. Consequently, since all other gears between the compressor cam shaft and the sprocket 31 have a one to one ratio, the proper one to two ratio for the cam, is provided for by making sprocket 31 twice the diameter of driving sprocket 31b.

The central cam shaft i, is driven through speed-reducing gearing, and as shown in dotted lines Fig. 2, this includes sprocket h, on said shaft i; chain g; sprocket f; shaft e; sprocket d; chain c; sprocket b; and shaft a, which latter is driven through sprocket a' preferably from another sprocket on the same motor shaft that drives adjacent chain 26d, of the needle-spinning mechanism.

Referring again to Fig. 2, it will be seen that during the time when the spinning needles have been operating, the compressor piston 13 has been held in its lowermost position by the concentric small radius portion of compressor cam 40, which is engaged by a roller 13a, carried by radius arm 13b, pivoted on shaft 13c, and which controls said piston 13, through link 13d which is adjustable for wear and tear and also for various compressions that may be desired for the pads.

By the time cam 40 has rotated far enough to have roller 13a traverse the concentric small radius part of its groove and before the outward slant to the large radius part begins, the spinning needles now shown in Fig. 2, will have completed their work of rolling up the metal wool in cylindrical form and will have been withdrawn. Thereupon the cam groove forces the compressor piston upward, closing the ribbon inlet opening 11 through the side walls of the compression chamber 12. Then, before the loosely wound metal wool has been substantially compressed, the pump operates to expel fluid soap through the cavity 50 and openings 51, into the compression cylinder 12, downward onto said uncompressed wool. As shown in Fig. 7, the discharge of the soap is effected by means of a piston 61 reciprocating in pump cylinder 62. The flow of the soap to and from this pump cylinder is controlled by a three-way valve 63, which, during the suction stroke, communicates with the supply pipe 64, through which the soap flows from the soap kettle. In the position shown in Fig. 7a, the pump is in communication with the downflow outlet pipe 66, through which the soap flows into said chamber 50. This three-way valve 63 is controlled by lever 68. It will be obvious from the Fig. 7a that when this lever is rocked on its axis, toward the right, the pump will be in communication with the soap supply pipe and the downflow outlet through pipe 66, will be closed.

As shown in Fig. 3, the means for operating the pump plunger and valve include the central shaft i, which rotates shaft r at right angles thereto, through 1 to 1 bevel gears; and shaft r, through chain s, rotates a higher level shaft t, at the same speed. As shown in Fig. 7a, shaft t carries a peripheral push-cam 70, which positively pushes upward on horizontal lever 71 and link 72, thereby causing bell crank 73, pivoted at 74, to retract link 75 which is pivoted to collar 76, which is adjustably secured on the stem 65, of piston in soap pump 62. The lever 71, is pulled downward by a parallel lever 71a, which is pushed downward by said cam 70, this motion being transmitted to lever 71 through a link 77, which can be lengthened or shortened, as by axial rotation of its shank portion, to screw it in or out of the end pieces whereby it is pivoted to said levers 71, 71a.

There may be, and usually is a certain amount of lost motion between up-push on lever 71 and down-push on lever 71a; and this lost motion is biased in favor of contact of lever 71, with cam 70, by tension spring 78 which is stretched forward from link 75, to the frame of the machine. The length of stroke of the pump may be changed by shifting the upper pivot of link 72, in the slot 72a of bell crank 73.

The pump valve lever 68, is shifted to soap intake and soap discharge positions, by link 79, bell crank 80, and link 81, which is actuated through a pair of parallel levers 82a, 82b, connected by adjustable link 82c, and engaging cam 83 on shaft t.

While the soap valve 63 is open, the compressor piston 13 continues its upward movement and compresses the cylindrical wool into a relatively thin layer by pressure against the stationary end closure 15 through which the soap is being discharged. This pressure serves to flatten the cylindrical wool to a relatively thin square pad impregnated with soap, as indicated more or less diagrammatically in Fig. 9. Piston 13 then withdraws, leaving the cake in the mold; and the soap valve closes.

The side-wall, or frame element of the mold in which the piston 13 leaves the cake, is a square hole 12a in an edgewise movable plate 12b and, in this case this plate is a rotor which is shown in Fig. 4 as having eight such holes, equally distributed at equal distances from the axis of shaft 12c, on which said rotor is mounted. As shown in Fig. 2, this shaft 12c is parallel with the compressor; and, as shown in Fig. 4, the mold holes 12a are successively indexed to and held in position of registry with the compressor, by a rotary Geneva cam and stop drive 89, of well known type, which is keyed on the above mentioned vertical shaft *p*, as indicated in Figs. 2 and 4.

The upper end of this same shaft *p* carries a cam 90 for holding out of operation and permitting operation of an ejector 91 registering with one of the frame holes 12a of rotor 12b. The shape of this cam is shown in Fig. 1, which in connection with Fig. 2 will make it obvious that the ejector 91 is held in retracted position, with the spring 92 compressed, during most of the revolution of said vertical shaft *p*. To so hold it, the cam 90 applies thrust on bell crank 93 operating through link 94 to lift the stem of the ejector against gravity and against pressure of said spring; but at the proper time, when the frame rotor is locked by the Geneva stop, a depression in the cam allows the spring to operate and eject the pad onto conveyer 100. The intake end of this conveyer is rotated through sprocket 99, chain 98, and sprocket 97, on the above described intermediate shaft *r* which is rotated by shaft *i*, through the 1 to 1 bevel gears.

This shaft *r* also drives the rotary knife 4 through sprocket *u*, chain *v*, and sprocket *w*, on the shaft 4b, whereon the rotary knife 4 is mounted. As indicated in Fig. 1, this shaft has slight endwise play, and is thrust to the left by spring 4c so as to yieldably hold the rotary knife 4 in shearing relation to the stationary shear 4a.

There are certain details of functioning of the spinning needles which contribute to the production of a fluffy cylindrical roll; and to a distribution of the wool therein particularly adapting it for flattening and compression into pads having approximately standard weight and standard distribution of wool therein, as well as standard thickness and peripheral form. Referring to Fig. 7, it will be seen that the bushings 18, which are rotated by the slidable needles 17, 17a, have their inner surfaces flush with the walls of compressor chamber 12. Moreover, these continuously rotated bushings have a diameter substantially equal to the width of said chamber. Consequently, when the wholly free ribbon x^2 is engaged by the needles, the edge portions of said ribbon bear against surfaces that are rotating therewith, and they will encounter no frictional resistance and will be subject to no endwise compression while the strip has been wound to a width approximately that of said chamber. Moreover, the ribbon, being entirely free, there is nothing to apply any radial inward pressure, or any longitudinal tension on the ribbon such as could promote tight winding, or otherwise deprive it of its characteristic of relative fluffiness.

Moreover, after the needles are withdrawn the cylinder tends to have end support and rotate with said inner surfaces of said bushings; and even while the compressor piston is pushing the cylinder upward a distance substantially equal to its own diameter, substantial portions of the end surfaces of said cylinder are in contact with said rotating, high-speed inner faces of said bushings, and tend to be more or less rotated thereby. These factors combine to form a cylinder with definite, but uncompressed end surfaces and also to rotate such cylinder on its axis. So, while it is practically impossible to observe just when the wool cylinder stops rotating, indirect evidence, such as the distribution of the soap in the wool, indicates that at the time when the inlet opening 11 closes and the discharge of the soap begins, the wool cylinder has substantial rotation about its own axis, thereby distributing soap over the cylindrical surface thereof.

We claim:

1. A method of making soaped metal wool pads from fluffy metal wool, which includes successively forming approximately equal weights of the fluffy wool into fluffy bodies, discharging fluid soap on said wool while in fluffy condition, then highly compressing the thus soaped fluffy wool, to distribute the fluid soap therein and form a relatively dense pad of predetermined shape and then solidifying said soap.

2. A method of making soaped metal wool pads from metal wool ribbons of the class described, which includes stretching the ribbon toward its elastic limit; severing approximately equal lengths thereof while so tensioned; forming each length into a fluffy body, discharging fluid soap on the outer surface thereof, highly compressing the thus soaped fluffy body to distribute the fluid soap therein and form a relatively dense pad of predetermined shape; and then solidifying said soap.

3. A method of making metal wool pads from metal wool ribbons, which method includes separating the ribbon into lengths suitable for one pad, winding each length of ribbon without tensioning it, to form a fluffy roll, supplying the roll with fluid soap; highly compressing the roll diametrically, to flatten it, distribute said fluid soap therein, and form a relatively dense pad of predetermined shape; and then solidifying said soap.

4. A method of making metal wool pads from fluffy metal wool ribbons of the class described, which includes segregating lengths of ribbon of approximately equal weight, loosely winding each length to form a fluffy roll having length and diameter approximating the two larger dimensions of the desired pad; discharging fluid soap on the fluffy roll; flattening the thus soaped fluffy cylinder diametrically, to distribute said fluid soap therein and form a relatively dense pad having one of its dimensions approximately the same as the length of the cylinder; and then solidifying said soap.

5. A method of making metal wool pads from metal wool ribbons, which method includes successively stretching lengths of ribbon to approximately the same predetermined tension, cutting off successive substantially equal lengths thereof while under such tension, and when released from such tension, loosely winding each length of ribbon, to form a roll; discharging fluid soap on the roll; highly compressing the roll to flatten the same, distribute said fluid soap therein, and form a relatively dense pad of predetermined shape; and then solidifying the soap.

6. A method of making soaped metal wool pads from metal wool ribbons, which method includes successively stretching lengths of ribbon to ap-

proximately the same predetermined tension and cutting off successive substantially equal lengths thereof while under such tension, loosely winding each length of ribbon to form a roll; discharging fluid soap upon the peripheral surface thereof, applying high pressure diametrically of said roll, to distribute the fluid soap therein and flatten it to form a relatively dense pad of predetermined shape; and then solidifying said soap.

7. A method of making soaped metal wool pads from metal wool ribbons, which method includes successively stretching lengths of ribbon to approximately the same predetermined tension and cutting off successive substantially equal lengths thereof while under such tension, loosely winding each length at high speed to form a loosely wound roll; and, while the roll still has rotary motion about its own axis, discharging fluid soap upon the peripheral surface thereof; applying high pressure diametrically of said roll to distribute the fluid soap therein and flatten it to form a relatively dense pad of predetermined shape; and then solidifying said soap.

8. A method of making soaped metal wool pads from metal wool ribbons, which method includes separating the ribbon into lengths suitable for one pad, loosely winding each length of ribbon, to fluffy, cylindrical form at high speed and, while the cylinder still has rotary motion about its own axis, discharging fluid soap upon the cylindrical surface thereof, highly compressing the thus soaped fluffy metal wool, to distribute the fluid soap therein and flatten it to form a relatively dense pad of predetermined shape, and then solidifying said soap.

9. A method of making soaped metal wool pads from fluffy metal wool ribbons of the class described, which includes segregating lengths of ribbon of approximately equal weight, loosely winding each length to form a fluffy roll; having length and diameter approximating the two larger dimensions of the desired pad; discharging fluid soap on the outer surface of the fluffy roll; flattening the thus soaped roll diametrically, to distribute the fluid soap therein and form a relatively dense pad having one of its dimensions approximately the same as the length of the cylinder; and then solidifying said soap.

10. A method of making soap impregnated metal wool pads from fluffy metal wool ribbons of the class described, which includes segregating lengths of ribbon of approximately equal weight, winding each length to form a fluffy roll having axial length approximately equal to one of the dimensions of the desired pad; flattening the thus soaped fluffy cylinder diametrically, under high pressure, to distribute the soap therein and form a relatively dense rectangular pad; and then solidifying said soap.

11. A method of making soaped metal wool pads from fluffy metal wool ribbons of the class described, which includes segregating lengths of ribbon of approximately equal weight, loosely winding each length on ellipse-producing centers to form a fluffy roll having an approximately cylindrical periphery, while edgewise confining the ribbon to an axial length approximately equal to one of the dimensions of the desired pad; then releasing said fluffy roll from ellipse-producing restraint; discharging fluid soap on the outer surface thereof, flattening the thus soaped fluffy roll diametrically, under high pressure to distribute the soap therein and form a relatively dense rectangular pad; and then solidifying said soap.

12. A method of making soaped metal wool pads from fluffy metal wool ribbons of the class described, which includes segregating lengths of ribbon of approximately equal weight, loosely winding each length on ellipse-producing centers to form a fluffy roll, while edgewise confining the ribbon to an axial width approximately equal to one of the dimensions of the desired pad, then releasing said roll from ellipse-producing restraint; and discharging fluid soap thereon; flattening the roll diametrically, under high pressure, to distribute said fluid soap therein and form a relatively dense rectangular pad, and solidifying said soap.

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