

Nov. 15, 1949

C. P. CROSSLEY

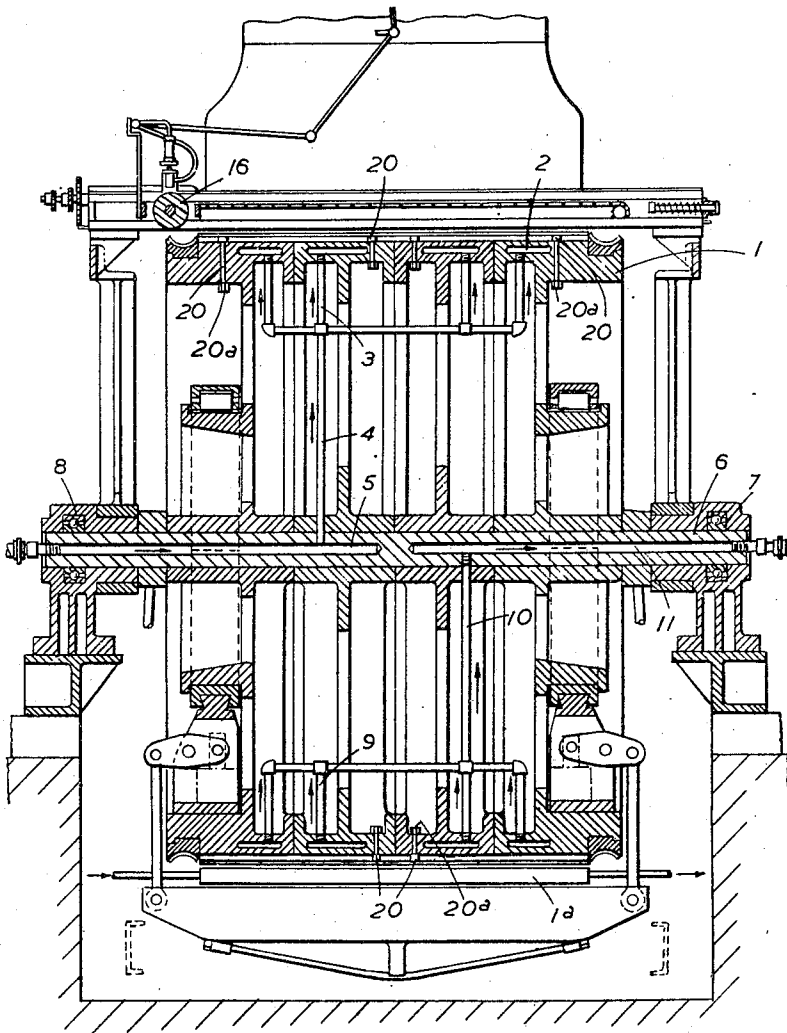
2,488,004

MANUFACTURE OF PILE FABRICS

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6 Sheets-Sheet 1

FIG. 1.



Inventor
CHARLES PATRICK CROSSLEY

By
Toulmin & Toulmin
Attorneys

Nov. 15, 1949

C. P. CROSSLEY

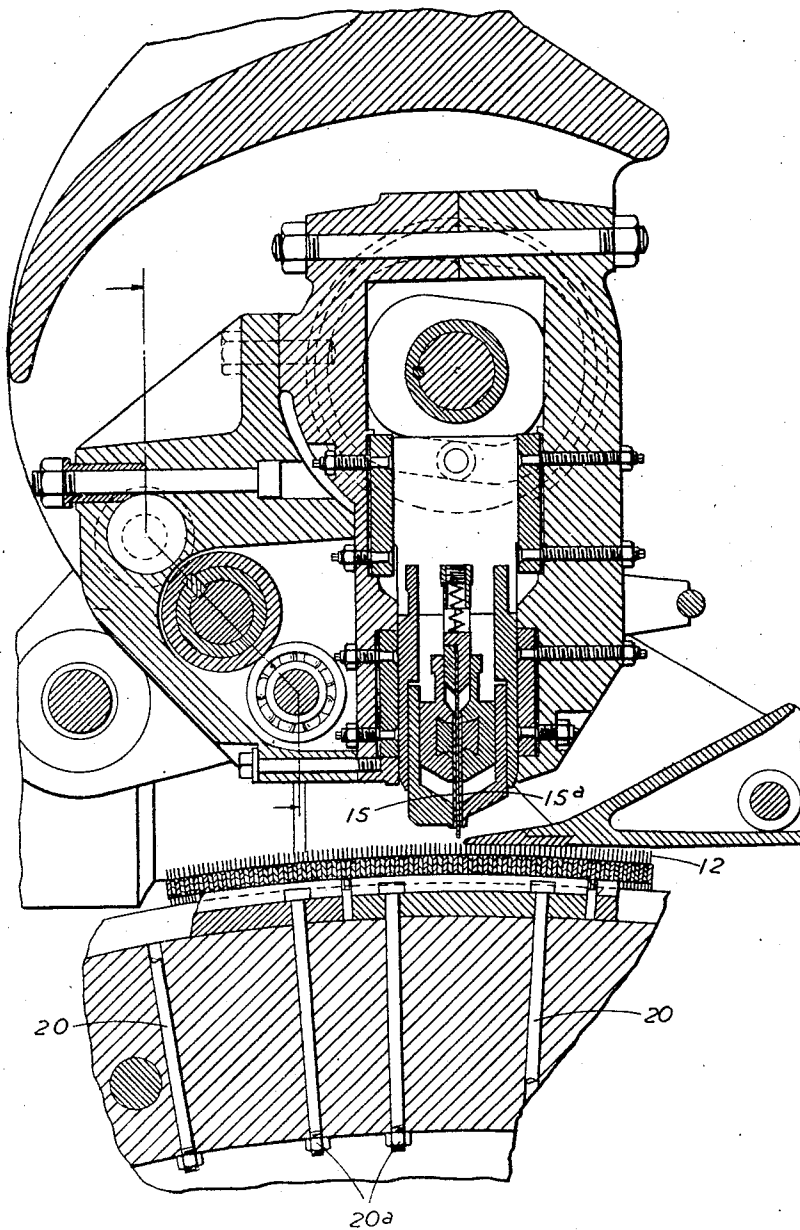
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FIG. 2.



Inventor
CHARLES PATRICK CROSSLEY

By
Toulmin & Toulmin
Attorneys

Nov. 15, 1949

C. P. CROSSLEY
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FIG. 3.

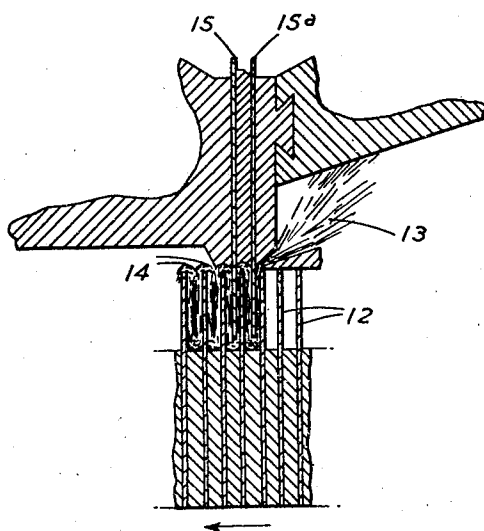
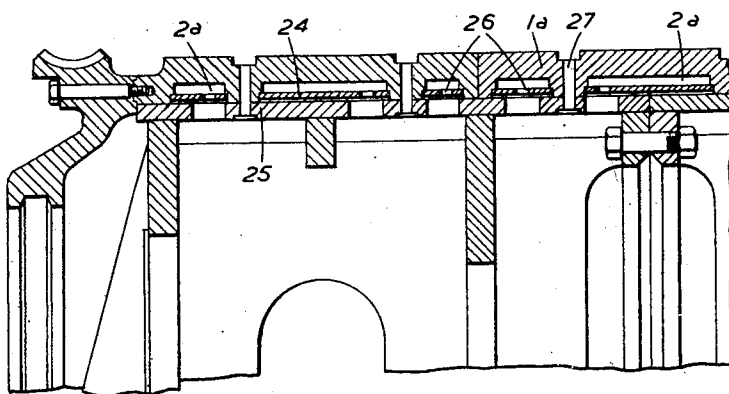


FIG. 4.



Inventor
CHARLES PATRICK CROSSLEY
By
Toulmin & Toulmin
Attorneys

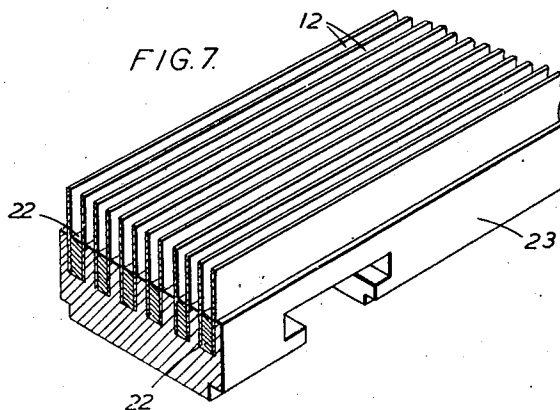
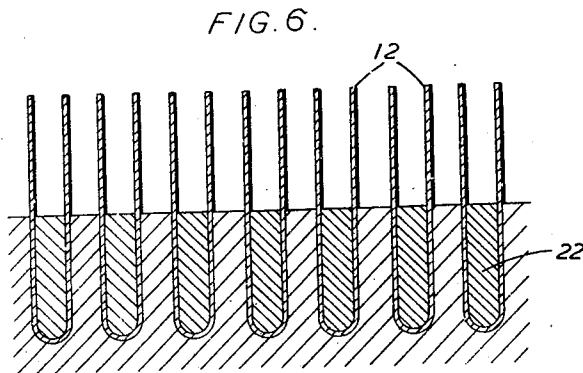
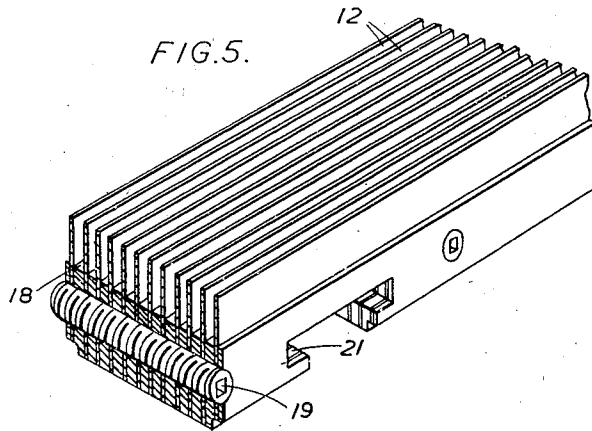
Nov. 15, 1949

C. P. CROSSLEY
MANUFACTURE OF FILE FABRICS

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Inventor
CHARLES PATRICK CROSSLEY
By
Toulmin & Toulmin
Attorneys

Nov. 15, 1949

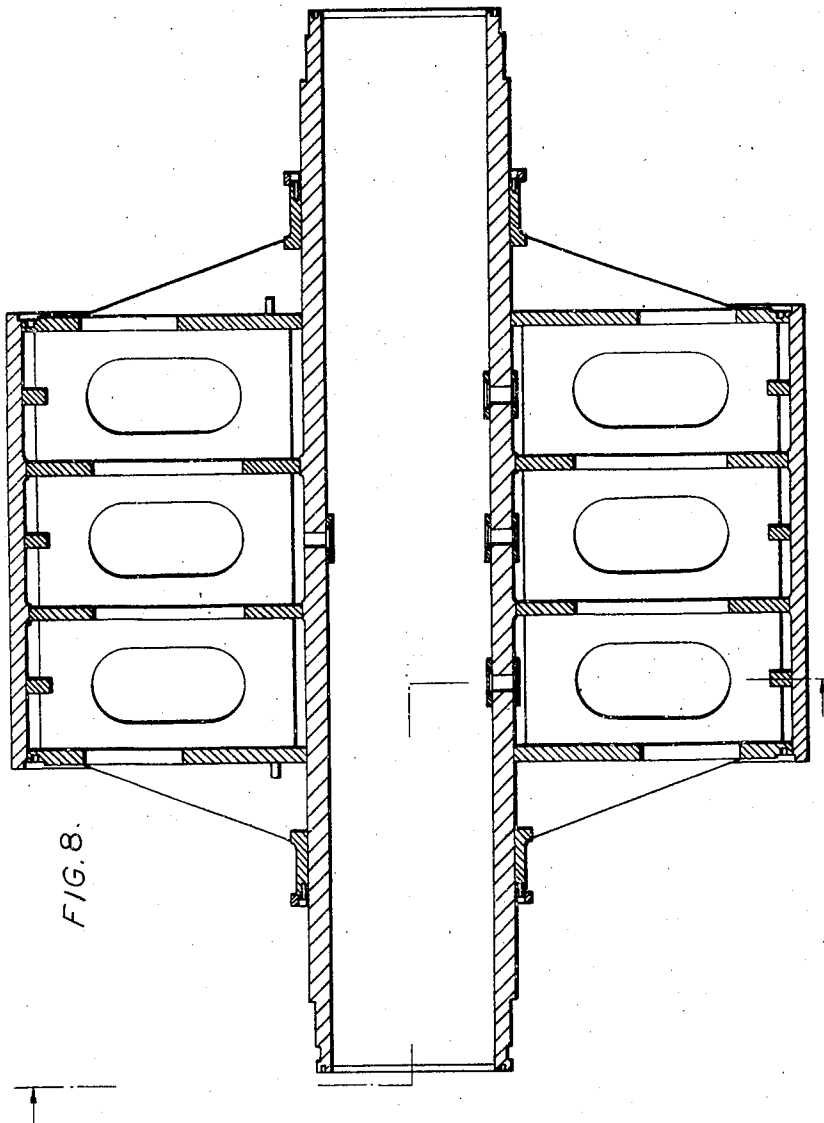
C. P. CROSSLEY

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MANUFACTURE OF PILE FABRICS

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Inventor
CHARLES PATRICK CROSSLEY

By
Toulmin & Toulmin
Attorneys

Nov. 15, 1949

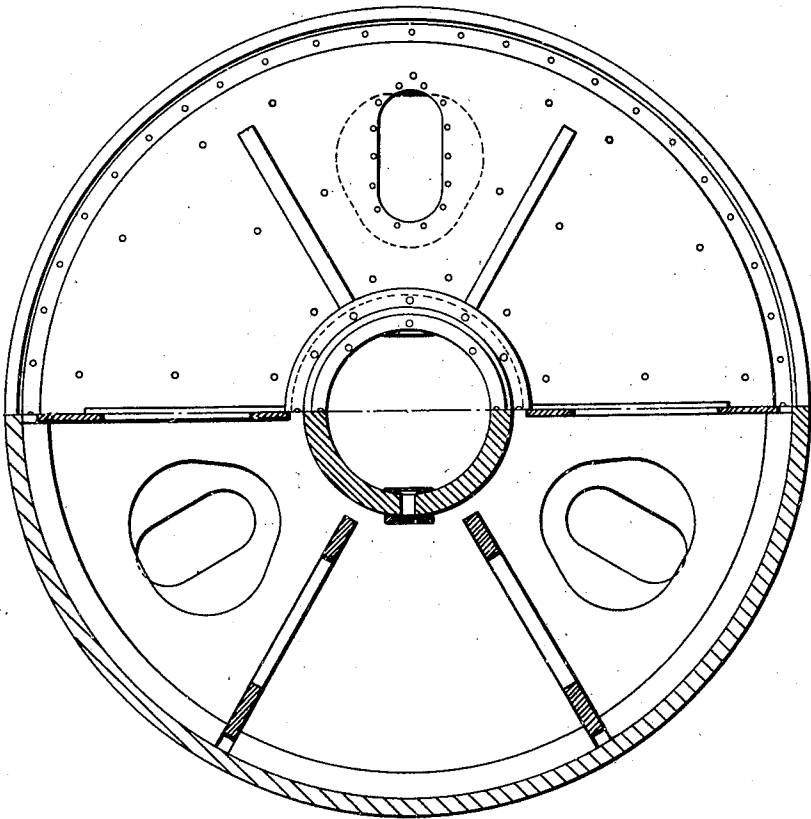
C. P. CROSSLEY
MANUFACTURE OF PILE FABRICS

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FIG. 9.



Inventor
CHARLES PATRICK CROSSLEY

By
Toulmin & Toulmin
Attorneys

UNITED STATES PATENT OFFICE

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MANUFACTURE OF PILE FABRICS

Charles Patrick Crossley, Halifax, England

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8 Claims. (Cl. 154—1.1)

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This invention relates to pile fabrics which are manufactured by (a) forming pile elements (such as fibres in the form of a batt) into a series of folds arranged sufficiently close to one another that a substantially continuous surface is formed by at least one of the series of ends of the folds which lie in line and (b) adhesively securing the surface so formed to a backing.

The folds are arranged sufficiently close to one another by folding mechanism operable to press the pile elements into spaces formed between a series of "wires" arranged sufficiently close to one another that the elements when pressed into the spaces between adjacent wires form the exposed ends of the folds into a substantially continuous surface.

The object of the present invention is to simplify the arrangement of the wires employed in the formation of the folds in such a manner that the manufacture of the complete fabric producing machine is facilitated, its cost of production reduced and time of stoppages occasioned by damage to the wires greatly reduced.

According to the present invention there is provided a machine for manufacturing pile fabrics of the type specified, wherein any one of the wires of a plurality of wires forming the spaces into which the pile elements are pressed to form a fold is mounted upon a supporting member so as to be removable therefrom and a substitute replaceable therefor without of necessity disturbing any more than at the most the next adjacent wire.

The invention will be more particularly described with reference to the accompanying drawings, in which:

Figure 1 illustrates in sectional elevation a mechanism constructed to form pile elements into folds and deliver the same in readiness to be adhesively secured to a backing;

Figure 2 illustrates on an enlarged scale folding mechanism operable to press pile elements into the spaces formed between a series of wires;

Figure 3 illustrates on an enlarged scale to Figure 2 the formation of pile elements into a series of folds arranged sufficiently close to one another that the exposed ends of the folds form a substantially continuous surface;

Figure 4 illustrates on an enlarged scale a modified construction of part of the mechanism illustrated in Figure 1;

Figure 5 illustrates on an enlarged scale the manner in which a series of wires are secured into bundles with the wires maintained sufficiently close to one another that when the pile elements

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are pressed into the spaces between adjacent wires, the exposed ends of the folds are formed into a substantially continuous surface;

Figures 6 and 7 illustrate two constructions in accordance with the present invention, whereby in the case of Figure 6, any pair of the wires and in the case of Figure 7, any one of the wires of a plurality of wires forming the spaces into which the pile elements are pressed to form a fold, are mounted upon a supporting member so as to be removable therefrom and a substitute replaceable therefor without of necessity disturbing any more than at the most the next adjacent wire; and

Figures 8 and 8 illustrate part sectional side and end elevations of a drum constructed so as to permit the surface thereof to be provided with milled grooves in which wires can be mounted in accordance with the present invention and particularly in the manner illustrated in Figure 6.

Referring to the drawings, there is illustrated in Figures 1 and 2, a mechanism which comprises a drum 1, which is cast so as to provide in the periphery thereof steam chambers 2 which extend around the drum. The steam chambers 2 are connected to conduits 3 arranged in communication with a conduit 4 which communicates with a steam passage 5 formed axially in a shaft 6 rotatable in bearings 7 and 8. The above construction permits steam to be admitted axially of the drum 1 so as to keep a constant supply of steam fed to the steam chambers 2, the steam being exhausted through conduits 9 and 10 into a second axial passage 11 formed in the shaft 6. The surface of the drum 1 is, in accordance with the above construction, maintained at a desired temperature.

Referring particularly to Figure 2, there is mounted upon the surface of the drum 1 a series of wires 12, the construction of which will be more particularly described with reference to Figure 5. The wires 12 are mounted on the drum 1 so that the wires are arranged sufficiently close to one another that when pile elements 13 (such as fibres in the form of a batt) are pressed into the spaces between adjacent wires 12 (Figure 3) the exposed ends 14 of the folds are formed into a substantially continuous surface. The pile elements 13 (Figure 3) are pressed into the spaces formed between adjacent wires by a folding mechanism (Figure 2) operable periodically to move reciprocal blades 15 and 15^a (Figure 3) downwardly so as to press the pile elements 13 between a pair of wires so as to form folds between adjacent wires in the manner indicated in Figure 3.

The folds, formed between the adjacent wires

12. are moved forwardly as the drum 1 rotates, bringing the exposed ends 14 of the folds beneath a roller 16 (Figure 1) operable to spread an adhesive, for example unvulcanised rubber, upon the exposed ends 14 of the said folds. The drum thereafter carries the exposed ends 14 of the folds coated with adhesive to a backing and the backing and the exposed ends of the folds are subjected to heat both internally through the drum and externally through steam heated platens 1^a so as to vulcanise the rubber solution and cause the backing to adhere to the exposed ends 14 of the folds. The backing is thereafter led away from the drum whereupon the folds of pile elements are drawn from the adjacent spaces between the wires so as to free the wires and permit the same to rotate once again with a supply of pile elements beneath the folding mechanism illustrated in Figure 2, thereby providing a continuous method of manufacturing a pile fabric.

It will be appreciated that certain details such for example as cropping have been omitted as it is assumed that the general method and means outlined above is sufficiently well known in detail in the art as not to necessitate a specific description of the fabric or the mechanism at present employed in manufacturing the same.

It has been found in practice that in spite of the most careful treatment, foreign elements are liable to find their way into the batt so that when the reciprocating blades of the folding mechanism move downwardly a wire is damaged.

Once a wire is damaged it is necessary to stop the machine and either repair the damaged wire or wires or, if damaged beyond repair, to remove the wire or wires and replace it or them by a new wire or wires.

With the machine at present employed in the manufacture of pile fabrics of the above character, the wires are constructed in the manner illustrated in Figure 5, namely by a series for example 12 wires being mounted with spacing elements 18 disposed between adjacent wires and the whole drawn up by a screw 19 so as to form the wires into a "bundle." Each bundle of wires extends across the full width of the drum, and each wire is approximately $\frac{1}{40}$ of an inch thick and the distance between adjacent pairs of wires is little over $\frac{1}{16}$ of an inch.

The bundles of wires are secured to the surface of the drum 1 by means of bolts 20 (Figure 2) which extend through the periphery of the drum at those portions thereof where there is no steam chamber. The bolts engage with a series of slots 21 (Figure 5) formed in the underside of the bundle of wires and by screwing up the nuts 20^a a bundle of wires is firmly clamped upon the surface of the drum.

It will be appreciated that with the construction illustrated in Figure 1, when a wire or wires becomes or become damaged, the machine has to be stopped and allowed to cool down to such an extent as to permit an operator to climb into the interior thereof, disconnect the appropriate bundle of wires by loosening the nuts 20^a of the bolts 20 which extend through into the interior of the drum and thereafter replace the bundle of wires in which one or more wires is or are damaged by a new bundle of wires. The new bundle of wires then has to be bolted down upon the surface of the drum, whereupon steam can once again be admitted to the steam chambers and only after the drum has reached the desired temperature can the operation of the machine be recommended. It is found in practice that the

stoppage necessary for replacing a wire considerably reduces the efficiency of a machine and it will be appreciated that if a more simple method of attaching the wires to the drum could be devised the efficiency of the machine would be considerably enhanced.

Referring to Figures 6 and 7, there are illustrated, according to the present invention, two methods of obviating the disadvantages inherent in existing machines.

Figure 6 illustrates a portion of the surface of a drum wherein the wires 12 are of U-form and are mounted upon the surface of the drum by milling grooves into the surface thereof and thereafter caulking the wires into the surface of the drum by means of, for example, copper caulking 22.

With a construction of the character illustrated in Figure 6, it will be observed that if one of the wires is damaged during the operation of the machine, it is only necessary to remove both the caulking 22 and the damaged wire and replace the wire by a new one and recaulk the new wire in position.

It will be appreciated that although the wires illustrated in Figure 6 are of U-formation, they could be constructed as independent wires.

In order to employ the principle underlying the present invention upon existing machines in which the drums are constructed so as to employ bundles of wires such for example as the machine illustrated in Figures 1 and 2, the wires are mounted in a supporting member 23 (Figure 7) which is of similar cross-section to the lower portion of the bundle of wires illustrated in Figure 5. The supporting member 23, however, comprises a single piece of material as distinct from the laminated construction of the lower portion of Figure 5. The wires 12 are held in the supporting member 23 by means of the caulking 22 in a manner similar to that illustrated in Figure 6.

It will be appreciated that although the bundle of wires illustrated in Figure 7 will be attached to the drum by means of bolts extending through the drum in the same manner in which the bundles of wires illustrated in Figure 5 are, according to existing practice, attached to the drum, nevertheless a construction in accordance with the present invention presents the distinct advantage over the existing practice inasmuch as when it becomes necessary to replace a damaged wire it is not essential to remove the whole bundle, which includes the damaged wire; it suffices to remove the caulking which is holding the damaged wire in position and substitute a new wire for the damaged one.

Thus it will be seen that according to the present invention there is provided a method of mounting the wires in a machine for producing pile fabrics of the character hereinbefore referred to, wherein any one of the wires of a plurality of wires forming the spaces into which the pile elements are pressed to form a fold is mounted upon the supporting member (whether that member be the drum itself or a member securable to the drum) so as to be removable from the supporting member and a substitute replaced therefor without disturbing any more than at the most the next adjacent wire. It will be appreciated that where the wires are of U-formation the next adjacent wire must be removed with the damaged wire and also in cases where the wires are separate it may prove simpler to remove a pair of adjacent wires and caulk in a new pair than to remove one wire and insert a new one in its place.

It will be appreciated that the invention above referred to is particularly applicable to wires mounted upon drums but it is to be understood that it is not limited to drums and can be employed upon a machine employing a flat bed which is movable beneath a folding member.

Referring to the known construction of machine (Figure 1), where the wires are mounted in bundles upon the surface of the drum with the bolts extending through the wall of the drum at those portions thereof disposed between the steam chambers, it will be readily appreciated that in the example illustrated in Figure 1, the drum is formed from cast iron and the metal, which is liable to be of a porous character, permits steam to penetrate to the fabric as it is being formed. In a modified construction of drum illustrated in Figure 4, a steel drum 1^a was formed, from which the steam chambers 2^a are cut out from the inner surface. The chambers 2^a are closed by steel plates 24 which are secured to the side walls of the chambers 2^a by welding. The drum 1^a is then shrunk upon an inner drum 25 and bolts (not shown) are arranged to extend through the drum at points between the steam chambers 2^a in the manner hereinbefore described with reference to Figures 1 and 2. The steam is fed to the inlets 26 in a manner similar to that described with reference to Figure 1.

It has been found in practice that although the steel drum 1^a is non-porous there is a tendency for the welded joints of the plates 24 to break down and for steam to pass from the chambers 2^a through the bolt holes 27 to the pile fabric.

It will be seen that in accordance with the embodiment of the present invention in which the surface of the drum is milled and the wires (whether as individual wires or as shaped wires) are caulked into milled grooves formed in the surface of the drum, the efficiency of the machine is not only considerably improved from the point of view of each replacement of the wires when one becomes damaged, but the method of securing the wires, in accordance with the present invention, into the surface of a steam tight drum, enables the construction of the drum to be considerably simplified as, for example, in the manner illustrated in Figures 8 and 9, from which it will be observed that steam can be admitted to the whole of the interior of the drum from the centre of the shaft, thereby avoiding the complicated construction of drum illustrated in Figures 1 and 4, which involves the formation of steam chambers and at the same time ensures that steam cannot pass from the interior of the drum through the cylindrical surface thereof to the fabric as it is being produced.

Further it will be appreciated that with the construction of the drum illustrated in Figures 1 and 4, if only a single wire is damaged the amount of work involved in replacing it and the necessary period of stoppage involved is the same as if a complete bundle were damaged, whereas according to the present invention, if a single wire is damaged, it can be replaced in an extremely simple manner involving the minimum amount of stoppage.

It will be appreciated from Figures 8 and 9 by any one skilled in the art, that the cost of production of the drum necessary in the case where the wires are mounted in milled recesses formed in the surface of the drum, is considerably reduced, whilst at the same time the efficiency of the machine is considerably enhanced.

What I claim as my invention and desire to secure by Letters Patent of the United States is:

1. In a machine for manufacturing pile fabrics of the type specified, a cylindrical drum, a series of "wires" mounted on the surface of said drum parallel with the axis thereof, said "wires" being mounted in a series of milled grooves and held in correct spaced relationship to one another by means of detachable packing filling said grooves.

2. In a machine for manufacturing pile fabrics of the type specified, a drum provided with steam chambers, means for supplying steam to said chambers, a supporting member having grooves provided in the outer surface thereof, fastening means for fastening the said supporting member to said drum, said fastening means including bolts extending through the surface of the drum clear of the said steam chambers, a series of "wires" mounted in said grooves, and packing material exchangeably holding said "wires" in said grooves.

3. In a machine for manufacturing pile fabrics of the type specified, a drum comprising an unbroken surface with grooves provided therein, a series of "wires" mounted in said grooves and disposed parallel with the axis of said drum, packing material for detachably holding the said "wires" in the said grooves, and means for supplying steam to the unbroken interior surface of the said drum.

4. In a machine for manufacturing pile fabrics of the type specified, a drum comprising an unbroken cylindrical surface with U-shaped grooves provided therein, a series of "wires" of U-cross section mounted in said U-shaped grooves, said "wires" being disposed parallel with the axis of said drum, and packing material holding said "wires" in the said grooves and being removable therefrom to allow exchange of said "wires" individually and independently of each other.

5. A machine for manufacturing pile fabrics which comprises in combination, a rotatable body having grooves provided at the outer surface thereof and arranged parallel to the axis of rotation of said body, "wires" arranged in pairs, with each groove containing only one of said pairs, and holding means individually and detachably arranged between the "wires" of each pair, thereby allowing the removal of each pair of "wires" individually without affecting the other pairs.

6. In a machine for manufacturing pile fabrics of the type specified, a movable supporting member provided with a plurality of grooves substantially parallel to each other, a series of "wires" mounted in said grooves, detachable packing material associated with said "wires" for detachably holding said wires in said grooves, and a folding mechanism adjacent said supporting member and operable to extend periodically into spaces formed between the said "wires."

7. In a machine for manufacturing pile fabrics of the type specified, a rotatable cylindrical drum, supporting means mounted on said drum and provided with a plurality of grooves substantially parallel to the axis of rotation of said drum, means for connecting said supporting means to said drum, a series of "wires" mounted in said grooves, packing material associated with said wires for detachably holding said wires in said grooves to allow the exchange of each "wire" without disturbing more than the next adjacent "wire," and folding means adjacent said supporting means and operable periodically and temporarily to enter spaces between said "wires."

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8. In a machine for manufacturing pile fabrics of the type specified, movable means operable to move in a predetermined direction, a supporting member for said movable means, means for connecting said supporting member to said movable means, said supporting member being provided with a plurality of grooves substantially parallel to each other and substantially perpendicular to the direction of movement of said movable means, a plurality of "wires" mounted in said grooves, 5 packing material detachably associated with said wires for exchangeably holding said "wires" in said grooves so as to allow replacement of a "wire" without disturbing more than the next 10

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adjacent "wire," and folding means adjacent said supporting member and operable temporarily to enter the space between two adjacent "wires."

CHARLES PATRICK CROSSLEY.

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