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Aug. 25, 1925. 1,550,994

F. W. VICKERY

FELT RECONDITIONING APPARATUS

Filed Feb. 8, 1924 2 Sheets-Sheet 1

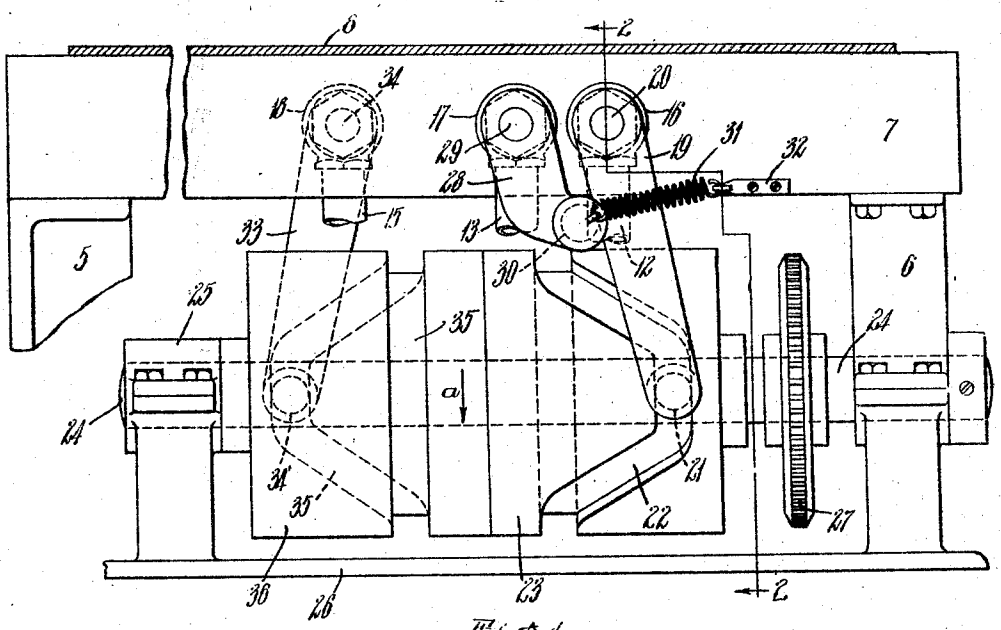


FIG. 1.

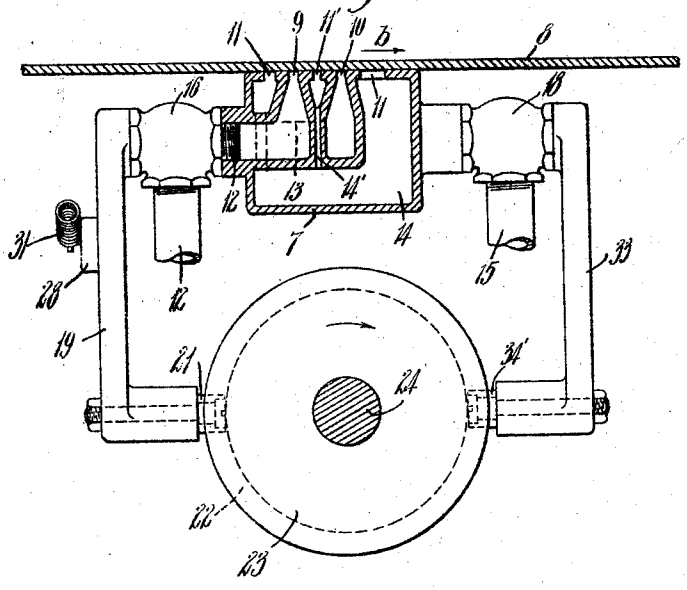


FIG. 2.

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by his attorney
Charles S. Gooding

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FELT RECONDITIONING APPARATUS

Filed Feb. 8, 1924 2 Sheets-Sheet 2

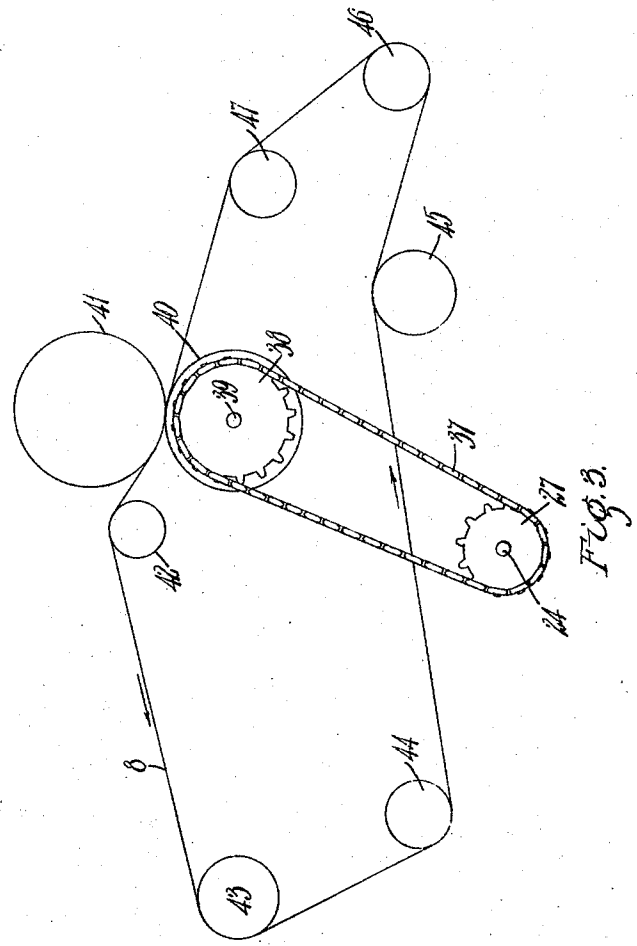


Fig. 3.

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UNITED STATES PATENT OFFICE.

FREDERICK W. VICKERY, OF LONDON, ENGLAND, ASSIGNOR TO VICKERY LIMITED, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

FELT-RECONDITIONING APPARATUS.

Application filed February 8, 1924. Serial No. 691,535.

To all whom it may concern:

Be it known that I, FREDERICK W. VICKERY, a subject of the King of England, residing at London, England, have invented new and useful Improvements in Felt-Reconditioning Apparatus, of which the following is a specification.

This invention relates to an apparatus for reconditioning the transporting felt belt of paper making machines.

In paper making machines, the felt belt conveys the paper pulp in web form between press rolls. These rolls press both the felt and the web of paper, squeezing out the water.

In paper machines of this class, after the felt belt has been used for a certain length of time it deteriorates, that is, the threads of the felt are pressed by the press rolls and are caused to assume a flattened shape. This flattening of the threads of the belt closes the pores of the felt and interferes with the squeezing of the water by the press rolls out of the paper web and through the felt belt. When this condition of affairs occurs, the character of the paper deteriorates. The deterioration of the felt belt is also partly due to dirt or other material which is left upon the felt belt by the paper web, but this is not the principal difficulty leading to the above deterioration of the felt, and it is the main object of this invention to overcome the difficulty hereinbefore set forth, namely, the deterioration of the felt belt by the flattening of the threads and the consequent lateral spreading of the threads and filling up of the spaces or pores which would otherwise exist in the felt belt.

If the felt belt is not reconditioned, the threads will return repeatedly to the press rolls in exactly the same relative positions, until all the elasticity is pressed out of them, and finally each thread takes a permanent set making a continuous impervious mat so that the water cannot pass through the same. When this happens, the paper manufactured on the machine becomes what is known technically as "crushed" and it becomes necessary either to stop the machine and install a new felt belt in order to restore the machine to its normal operative condition or to stop the machine and recondition the felt belt.

In order to overcome the flattening, widening and matting of the threads of the felt, this invention contemplates disturbing this matted condition so as to restore the threads as far as possible to their original shape and position by causing them to change their positions relatively to each other so that they will not constitute flattened threads each lying in a substantially horizontal plane.

In addition to the changing of the positions of the threads relatively to each other and correcting the flattened shape of the same, this invention contemplates removing the dirt from the felt belt, in other words, the invention contemplates cleaning the belt as well as reconditioning it with respect to the flattened threads thereof.

To these ends the apparatus of this invention contemplates employing a jet of water under pressure directed against one face of the felt belt preferably with sufficient force to cause the water to pass through the felt, and preferably the water employed should be hot, and in order to secure this desirable condition of the water, the apparatus of this invention contemplates using a jet of steam in close proximity to the jet of water.

In order to hold in position the portion of the belt to be operated upon by the jet of water and to recondition the felt belt, a reconditioning member is employed which is provided with suction ports extending entirely across that portion of the belt which is being reconditioned, suction is applied, which, acting through the suction ports in the opposite direction to the force of jets of water and steam holds the felt belt firmly upon the reconditioning member in which the water, steam and suction ports are provided. The reconditioning member includes means for supplying water and steam under pressure to their respective ports, as well as means for supplying suction at the suction ports.

It has been found that in order to prevent the threads of the felt belt from acquiring a permanent set, it is necessary to disturb them very vigorously and it is not sufficient in order to attain this result merely to force a jet of cleaning fluid through the felt, but if the fluid can be caused to return sharply upon itself, it will exert a twisting or curling effect upon the threads of the belt, where a jet passing

straight through the felt would merely thrust them aside.

The apparatus of this invention accomplishes this desirable result, that is, fluid, preferably water heated, is forced through the belt throughout the entire width thereof which is being reconditioned and then is drawn through the belt in the opposite direction by the suction device, and this causes a twisting or curling effect upon the threads which changes the relation of the threads to each other and overcomes the flattened condition hereinbefore referred to, and at the same time the felt will be cleaned thereby.

The device of this invention contemplates in one embodiment thereof applying suction continuously to the belt at the suction ports and intermittently shutting off the supply of water and steam, and in another embodiment intermittently shutting off the suction at the suction ports and intermittently shutting off the supply of water at the water ejecting port and of steam at the steam ejecting port.

It will be understood that in order that the belt should be reconditioned and have imparted to the threads thereof the twisting or curling effect hereinbefore referred to, that that portion of the belt which is being reconditioned must, during this reconditioning operation, be firmly held down against the upper face of the reconditioning member by the suction and in order that this should be carried into practical operation, therefore, the suction ports must be located adjacent to the ejecting port and preferably upon two sides thereof or entirely surrounding the same.

The invention consists in the improved method of reconditioning the felt belts of paper making machines and in the apparatus for carrying said method into practical operation, all as hereinafter set forth and particularly as pointed out in the claims.

Referring to the drawings:—

Figure 1 is a sectional elevation taken transversely of the belt of a paper making machine and illustrating an apparatus embodying my invention.

Fig. 2 is a sectional elevation taken on line 2—2, Fig. 1.

Fig. 3 is a diagrammatic side elevation as viewed from the right of Figure 1 of a portion of the felt reconditioning mechanism, transporting felt belt, and mechanism adapted to move the felt belt.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 5 and 6 are oppositely disposed side members of the frame of the apparatus, rigidly connected together by a beam 7, constituting a reconditioning member. A felt belt 8 is fed across the reconditioning member in contact with its upper face by mechanism well known to those skilled in the art of paper making machines.

The reconditioning member 7 is provided in its upper face with a fluid ejecting port 9, a steam ejecting port 10 and suction ports 11 and 11′ on opposite sides of and between said fluid and steam ports. The port 9 is connected by a pipe 12 to a source of water under pressure. The port 10 is connected by a pipe 13 to a steam supply, and the ports 11 enter a suction chamber 14 and the port 11′ enters a passage 14′ which, in turn, enters the suction chamber 14, which is connected by a pipe 15 with a suitable suction apparatus. A valve 16 is interposed in the fluid pipe 12. A valve 17 is interposed in the pipe 13 and a valve 18 is provided in the suction pipe 15.

A lever 19 is fastened to the stem 20 of the valve 16 and at its free end is provided with a cam roll 21 which travels in a cam path 22 provided in a cam 23 which is fastened to a shaft 24, rotatably mounted at one end thereof in the side frame 6 and at the other end thereof in an auxiliary frame 25 mounted upon a base 26. The standards 5 and 6 are also supported upon the base 26. The shaft 24 is rotated by a sprocket gear 27 driven by a chain 37 from a sprocket 38 which is fastened to a shaft 39, to which is fastened one of the feed rolls 40 of a felt feeding mechanism ordinarily used and well known to those skilled in the art of paper-making machines. The feed roll 40 co-operates with the feed roll 41 to feed the felt belt 8 in the direction of the arrows, see Fig. 3. The felt belt is guided by rolls 42, 43, 44, 45, 46 and 47.

A lever 28 is fastened to the stem 29 of the steam valve 17. This lever is provided on its free end with a roll 30 which bears against one edge of the lever 19 and is held thereagainst by a spring 31, one end of which is fastened to a bracket 32 which in turn is fastened to the reconditioning member 7. A lever 33 is fastened to the stem 34 of the suction valve 18, which has a cam roll 34′ journalled upon its free end, running in a cam groove 35 provided in a cam 36 also fastened to the shaft 24.

The apparatus is capable of applying a constant suction at the ports 11 and 11′ and intermittent jets of water and steam at the ports 9 and 10 respectively, or the suction may be applied intermittently as well as the jets of water and steam.

It will be understood that the ports 9, 10 and 11 extend entirely across the section of the belt 8 which is being reconditioned.

While a steam supplying port and pipe have been illustrated as means for heating the water from the fluid ejecting port 10, the steam may be entirely omitted if a sup-

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ply of hot water can be obtained for the purpose, or under certain conditions cold water may be used.

The general operation of the apparatus is as follows:—Assuming that an intermittent suction is to be applied to the belt and intermittent jets of water and steam, and that the parts are in the relative positions illustrated in Figure 1, and that the cam shaft 24 is being rotated by the sprocket gear 27 in the direction of the arrow *a*, Fig. 1, while the belt is being fed in the direction of the arrow *b*, Fig. 2, and assuming that all three of the valves are closed, it will be seen that as the cam 23 rotates in the direction of the arrow *a*, the throw of the cam will cause the lever 19 to be rocked toward the left, Fig. 1, and this will rock the lever 28 toward the left, thus opening the valves 16 and 17 by means of their respective stems 20 and 29 and as the cam 36 is rotated in the direction of the arrow *a*, the suction valve 18 will be opened by means of its lever 33 and stem 34. These valves will all remain open until they are closed by the cams 33 and 36 at the end of each rotation of the shaft 24.

It will be noted that the throw of the cam path 35 and its location relatively to the cam path 22 is such that the suction valve will be opened ahead of the water and steam valves and will be closed after the water and steam valves are closed.

When it is desired to have the suction continuous and the water and steam intermittent, the cam lever 33 is thrown out of operation and the suction will then be continuous upon the belt, while the jets of water and steam will be intermittent.

While I have described in the foregoing specification and have set forth in many of the claims a suction device for causing the water to return through the felt belt for reconditioning the same, I may, without departing from the spirit of this invention, cause the water to be returned through the belt by the direct pressure of air, provided by means other than suction, as it is evident that instead of suction supplied by a suction port located beneath the belt, pressure of air may be supplied above the belt and thus drive the water downwardly through the belt and into the port, which I have referred to as a suction port, or the pressure of air may be applied to the upper surface of the belt, together with the suction port and suction applied thereat, without departing from the spirit of my invention.

In the foregoing specification I have described the jet of water as being forced against the felt belt with sufficient pressure to cause it to pass through the belt. There are certain kinds of felt belts in which it is unnecessary to force the water through the belt, as sufficient movement of the surface of the threads can be obtained by forcing the fluid only partially through the belt, and it is to be understood, therefore, that this invention includes such a method of operation, and that the apparatus of this invention is capable of carrying into practical effect such a method of operation, the only difference in the operation of the apparatus being that more pressure is given to the water where it is desired to pass it entirely through the belt, than where it is desired to only pass it partially through the belt.

I claim:

1. The method of automatically reconditioning the transporting felt belts of paper making and similar machines which consists in intermittently forcing a jet of fluid against a felt belt and simultaneously throughout the entire width thereof while the belt is moving longitudinally thereof subjecting the portion of the felt against which said fluid has been forced to suction to cause the fluid to be ejected from said felt whereby the relative locations of the threads of the felt are changed.

2. The method of automatically reconditioning the transporting felt belts of paper making and similar machines which consists in intermittently forcing a jet of fluid against a felt belt and simultaneously throughout the entire width thereof while the belt is moving longitudinally thereof intermittently subjecting the portion of the felt against which said fluid has been forced to suction to cause the fluid to be ejected from said felt whereby the relative locations of the threads of the felt are changed.

3. The method of automatically reconditioning the transporting felt belts of paper making and similar machines which consists in intermittently forcing a jet of fluid against a felt belt and simultaneously throughout the entire width thereof while the belt is moving longitudinally thereof subjecting the portion of the felt against which said fluid has been forced to the pressure of air to cause the fluid to be ejected from the felt whereby the relative locations of the threads of the felt are changed.

4. The method of automatically reconditioning the transporting felt belts of paper making and similar machines which consists in intermittently forcing a jet of fluid against a felt belt and simultaneously throughout the entire width thereof while the belt is moving longitudinally thereof intermittently subjecting the portion of the felt against which said fluid has been forced to the pressure of air to cause the fluid to be ejected from said felt whereby the relative locations of the threads of the felt are changed.

5. An apparatus for reconditioning the transporting felt belt of a paper making

machine having, in combination, a stationary reconditioning member provided with a fluid ejecting port, means to supply fluid under pressure at said fluid ejecting port, mechanism adapted to move a transporting felt belt longitudinally thereof with one face closely adjacent to said port and means to cause air to impinge against the opposite face of said transporting felt belt on opposite sides of said port whereby said fluid may be ejected from said belt.

6. An apparatus for reconditioning the transporting felt belt of a paper making machine having, in combination, a stationary reconditioning member extending entirely across the width of said belt which is to be reconditioned and provided with a fluid ejecting port, and with a fluid suction port, both ports extending also across said width, means to supply fluid under pressure at said fluid ejecting port and means to intermittently shut off said fluid supply, means to apply suction at said suction port and mechanism adapted to move a transporting felt band longitudinally thereof with one face closely adjacent to said fluid ejecting and suction ports.

7. An apparatus for reconditioning the transporting felt belt of a paper making machine having, in combination, a stationary reconditioning member provided with a fluid ejecting port extending transversely of a transporting felt belt, and with fluid suction ports extending across said belt on opposite sides of said fluid ejecting port, means to supply fluid under pressure at said fluid ejecting port, means to intermittently shut off said fluid supply, means to apply suction at said suction ports and mechanism adapted to move a transporting felt band longitudinally thereof with one face closely adjacent to said fluid ejecting and suction ports.

8. An apparatus for reconditioning the transporting felt belt of a paper making machine having, in combination, a stationary reconditioning member extending entirely across the width of said belt which is to be reconditioned and provided with a fluid ejecting port, and with a fluid suction port, both ports extending also across said width, means to supply fluid under pressure at said fluid ejecting port and means to intermittently shut off said fluid supply, means to intermittently apply suction at said suction port and mechanism adapted to move a transporting felt belt longitudinally thereof with one face closely adjacent to said fluid ejecting and suction ports.

9. An apparatus for reconditioning the transporting felt belt of a paper making machine having, in combination, a stationary reconditioning member provided with a fluid ejecting port extending transversely of said belt, and with fluid suction ports extending across said belt on opposite sides of said fluid ejecting port, means to supply fluid under pressure at said fluid ejecting port, mechanism to intermittently shut off said fluid supply, means to intermittently apply suction at said suction ports, and mechanism adapted to move a transporting felt band longitudinally thereof with one face closely adjacent to said fluid ejecting and suction ports.

10. An apparatus for reconditioning the transporting felt belt of a paper making machine having, in combination, a stationary reconditioning member provided with a fluid ejecting port, a steam ejecting port, and with a fluid suction port on opposite sides respectively of said fluid and steam ejecting ports, means to supply fluid under pressure at said fluid ejecting port, means to supply steam under pressure at said steam ejecting port, mechanism to intermittently shut off said fluid supply and said steam supply, means to intermittently apply suction at said suction port, and mechanism to move a transporting felt band longitudinally thereof with one face closely adjacent to said fluid and steam ejecting ports and suction port.

In testimony whereof I have hereunto set my hand.

FREDERICK W. VICKERY.