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T. W. McFARLAND.

MACHINE FOR MAKING PAPER BOARD.

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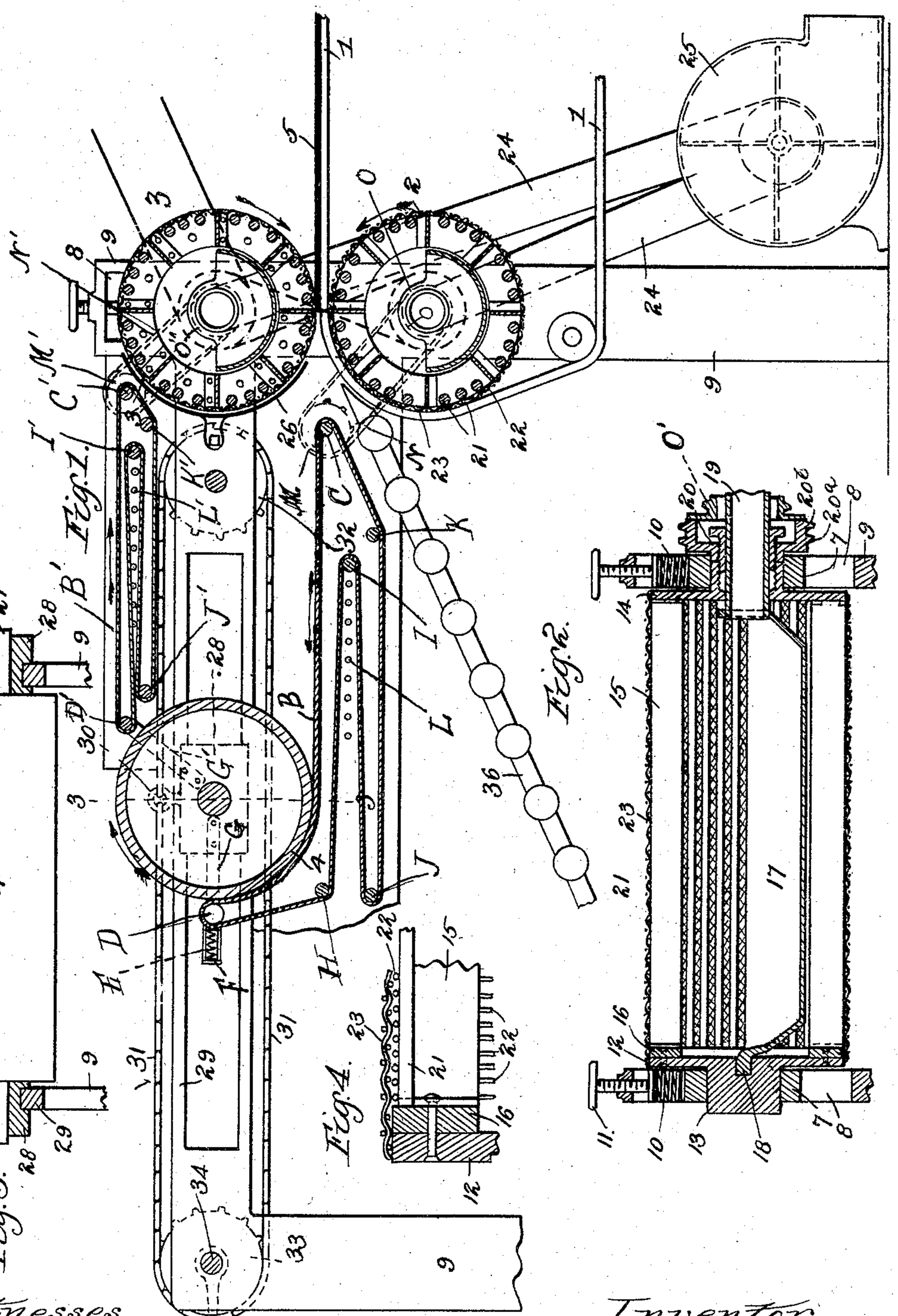

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UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING PAPER-BOARD.

SPECIFICATION forming part of Letters Patent No. 785,178, dated March 21, 1905.

Application filed June 29, 1903. Serial No. 163,449.

To all whom it may concern:

Be it known that I, THOMAS W. McFARLAND, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Making Paper-Board, of which the following is a full, clear, and exact specification.

My invention relates more particularly to machines for laying up heavy pelts for producing heavy board; and it has for its primary object to extract the moisture from each layer of the web as it is laid up.

Another object of my invention is to provide means whereby the laying-up rolls may be readily adjusted relatively, so as to adapt the machine for making pelts of various dimensions and also to adapt it for taking up the sag or wrinkles occurring in the endless pelt during the laying-up operation.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said object and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a vertical longitudinal section of my improved machine. Fig. 2 is a vertical longitudinal sectional view of the press-roll and its supporting-standards. Fig. 3 is a transverse sectional view taken on the line 3 3, Fig. 1, showing the adjustable roll and its guides in detail and on a smaller scale; and Fig. 4 is an enlarged detail longitudinal sectional view of one end of the roll 2.

As is well understood in this art, the thin web of paper is produced by a felt band running through a vat containing the paper-pulp and thence between rollers or press-rolls, which squeeze out more or less of the moisture and permit the web to be stripped from the belt and conveyed to a suitable laying-up machine. In the accompanying drawings, 1 represents the aforesaid felt band, the wet-machine and its pulp-vat not being shown, and 2 is a roll around which the band is returned to the vat. This roll 2 may be one of the aforesaid press-rolls, or, if desired, it may be a roll located at or near the front of the said press-rolls for receiving the band 1 as it comes from the latter. In either event there is located above the roll 2 and bearing upon the band 1 a press-roll 3, and opposite and parallel with the press-roll 3 is arranged a roll or cylinder 4. The web (indicated on band 1 by the heavy line 5) after passing through the rolls 2 3 is stripped from the felt band 1 by hand or by any other suitable means and is led to and around the cylinder 4, which is gradually turned in unison with the rolls 2 3 and the end of the web coaxed, as it were, back again over the cylinder 4 to the top of the roll 3, and thus wound around the roll 3 and cylinder 4 until a continuous band or belt of paper is formed, constituting a pelt whose thickness is of course dependent upon the number of layers of the web laid up on the cylinder 4 and roll 3.

Each layer of the web 5 as it is laid up is relieved of the greater part of its moisture, and this is accomplished by the construction of the press-rolls 2 3 and their combination with a moisture-exhausting apparatus, which I will now describe.

The detail section of the press-roll shown in Fig. 2 is really the roll 3; but the rolls 2 3 are the same in construction, and hence the description of one will suffice for both. The journals of the roll 3, however, are supported in sliding boxes 7, arranged in slots 8, formed in standards 9, and located over the boxes 7 are springs or cushions 10, whose tension is regulated by set-screws 11, threaded in the upper ends of the standards 9, so that the pressure of the roll 3 against the web and belt 1 may be regulated. The journals of the roll 2 are mounted in any suitable manner in the standards 9. In constructing these rolls 2 3 I provide each with a head 12 at one end, upon which is formed a journal 13. At the other end of the roll is arranged a head 14, to which is secured the ends of a number of longitudinal ribs 15, whose outer edges are substantially in line with the periphery of the roll. The other ends of these ribs 15 are secured to a ring 16, which in turn is removably secured to the head 12. This construction enables me to assemble the heads with the ribs 15, and thus form the skeleton of the

cylinder before the introduction thereinto of a moisture-catching trough or pan 17, which is admitted through the ring 16 before the head 12 is secured thereto. This pan or trough 17 is semicylindrical and hangs below the axis of the roll. One end of the pan is provided with a trunnion 18, which is seated in a suitable rest or socket in the head 12, as clearly shown in Fig. 2, while the other end of the pan is provided with a hollow trunnion or support 19, which passes through the head 14 and also through a stuffing-box 20, secured to the head 14 and constituting one journal of the roll 3. Arranged between the ribs 15, which latter are arranged radially with respect to the axis of the cylinder, are a number of longitudinal rods 21, located at a slight distance apart, and wrapped around these rods 21 is a wire 22, the convolutions of the wire wrapping being also a slight distance apart, and still around this wire wrapping is placed a sheath or covering of wire-gauze 23 or any other foraminous or perforated material, thus producing a roll with a porous surface, through which water and moisture from the web 5 and belt 1 may enter the roll and be conveyed upwardly therein by the ribs 15, which permit it to drain off or drip back into the pan 17. The hollow trunnions or supports 19 of the pans are connected by suitable flues 24 with a fan or other exhausting device 25, so that a partial vacuum is created and maintained within the hollow roll. This constant exhausting of the air from the hollow roll, creating a strong current through the meshes thereof and also through the web as it rolls on the upper roll, accelerates the evaporation of the moisture and induces the moisture and water to pass inwardly through the pores of the cylinder, the films of water formed in the meshes or pores being readily drawn downwardly into the pan 17 or converted into mist and conducted away by the strong draft through the hollow trunnion 19. If desired, a shield 26 may be located around that portion of the roll 3 which is not covered by the pelt 6, so as to compel a large percentage of the air passing through the pores of the cylinder to pass through the pelt.

The cylinder 4 has its journals 27 mounted in slides 28, which are in turn mounted in slotted guideways 29 in the sides of the frame, so that the cylinder may slide back and forth with reference to the roll 3. It is very essential, however, that when the cylinder 4 is thus adjusted its two ends be adjusted alike, so as to avoid destroying their parallelism, which would result in the buckling or wrinkling and often tearing of the web and the production therein of ridges or creases. To the end, therefore, that this adjustment may be effected with accuracy, I secure each of the slides 28, by means of an eye or other suitable device 30, to one of a pair of endless belts 31, running over sprocket-wheels 32 33, the latter of which are secured to a shaft 34, which may be rotated by a crank 35.

The size of the pelt, it will be observed, is dependent upon the diameters of the roll 3 and cylinder 4 and the distance between them, and since the slot in the side frames 29 and the chains 31 may be of almost indefinite length it will be seen that my machine provides a means whereby heavy pelts of great dimensions may be quickly and conveniently produced.

As before stated, the web may be conducted from the roll 2 to the cylinder 4 and thence back again to the roll 3 by hand for producing the first layer of the continuous pelt; but it is preferable to arrange between the roll 2 and cylinder 4 an endless conveyer for accomplishing this object. This conveyer is shown in the form of an endless band or belt B, which passes over a fixed roller C at a point near the roll 2 and presses upward against the under side of the cylinder 4 and thence passes around an adjustable roller D, mounted at one end in a sliding bearing E and pressed against the cylinder 4 by a suitable spring or other cushion F. The block E is mounted in an arm G, carried by the sliding bearing 28, so that the roller D will be adjusted in unison with the cylinder 4. From the outer side of the roller D the belt B descends around a guide-roll or idler H and thence passes horizontally under the top fold of the belt and toward the roll 2, where it passes around an idler I and again returns to an idler J, located under idler H, whence it is given another fold toward roll 2 and passes upwardly over the roll C, K being a guide-roll for keeping the bottom fold away from the roll I, which latter is made adjustable by being mounted in any one of a series of bearing-apertures L, so that should it be necessary to move the cylinder 4 forward or backward the slack in the belt or conveyer B may be taken up by a proper adjustment of the adjustable roll I. When this belt or conveyer B is complete, the web is conducted by hand from the belt 1 to the end of the conveyer B, and as the latter is driven in unison with cylinder 4 by a sprocket M on roll C, connected by chain or belt N with a sprocket O on roll 2, it will be seen that the conveyer will conduct the web to and around the cylinder 4, which latter will retain possession of it until stripped off at the top by hand, as usual. The end of the web is then laid upon another endless conveyer or band B′, which is similar in construction and arrangement to band B and which conducts the web from the cylinder 4 to the press-roll 3, it being taken from the end of conveyer B′ and placed against press-roll 3 by hand, thus being a continuous web around cylinder 4 and roll 3.

The band B′ is carried at one end on a roll D′, mounted at each end in an arm G′, secured to block 28, and at the other end it

passes around a driving-roll C′, which is driven by sprocket M′ and chain N′ from a sprocket O′ on press-roll 3. The slack of the band or conveyer B is taken up by a roll I′, secured adjustably in any one of a series of bearing-apertures L′, and rollers J′ and K′, corresponding, respectively, with rollers J and K, already described, and perform a similar function.

After the web has been sufficiently laid up on the roll 3 and cylinder 4 it is cut transversely and pulled off on an inclined skid or other suitable support 36.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a machine for making paper-board, the combination of two rolls, one of which is movable bodily with reference to the other, means for conveying the web to and around said rolls and means for moving both ends of the adjustable roll simultaneously.

2. In a machine for making paper-board, the combination of two rolls, one of which is movable bodily with reference to the other, means for conveying the web to and around said rolls, slides in which the ends of said movable roll are supported, and endless chains operatively connected together and also connected with said slides for adjusting them simultaneously.

3. In a machine for making paper-board, the combination of the endless web-carrying belt, a roll over which said belt runs, a press-roll engaging said belt on said first roll, and a third roll adjustable bodily with reference to said press-roll and around which press-roll and third roll the web is adapted to pass.

4. In a machine for making paper-board, the combination of the endless web-carrying belt, a roll over which said belt runs, a hollow perforated press-roll engaging said belt on said first roll, and a third roll adjustable bodily with reference to said press-roll, and around which third roll and the press-roll said web is wound, and an exhausting device connected with said press-roll.

5. In a machine for making paper-board, the combination of the endless web-carrying belt, a roll over which said belt runs, a press-roll engaging said belt and first roll, an adjustable cylinder arranged opposite and parallel with said press-roll, and the inclined skid 36 for conveying the sheet away from said press-roll.

6. In a machine for making paper-board, the combination of a pair of rolls, means for conducting a web to the meeting peripheries of said rolls, a cylinder arranged opposite and parallel with one of said rolls, an endless conveyer extending between said cylinder and the latter one of said rolls, and means for driving said cylinder, conveyer and the latter rolls in unison for conducting the web from said pair of rolls around said cylinder.

7. In a machine for making paper-board, the combination of a pair of rolls, means for conducting the web to the meeting peripheries of said rolls, a cylinder arranged opposite and parallel with one of said rolls, means whereby said cylinder may be adjusted relatively to said rolls, an endless conveyer extending from said rolls to and partially around said cylinder, and means for taking up the slack in said conveyer when the cylinder is adjusted.

8. In a machine for making paper-board, the combination of a pair of rolls, means for conducting the web to the meeting peripheries of said rolls, a cylinder adjustable relatively to said rolls, and arranged parallel therewith, an endless conveyer extending from said cylinder to a point contiguous to said rolls and bearing against the under side of the cylinder, means for taking up the slack in said conveyer when the cylinder is adjusted, and a second conveyer extending from the upper side of said cylinder to a point contiguous to one of said rolls.

9. In a machine for making paper-board, the combination of a pair of rolls, means for conducting the web to the meeting peripheries of said rolls, a cylinder arranged parallel with one of said rolls, a conveyer extending from a point contiguous to said rolls and bearing against said cylinder, means for driving said conveyer in unison with said rolls, a second conveyer extending between said cylinder and said rolls on the side of the cylinder opposite said first conveyer, and means for driving said second conveyer in a direction opposite to the direction of movement of said first conveyer and in unison with said rolls.

10. In a machine for making paper-board, the combination of a pair of rolls, means for conducting the web to the meeting peripheries of said rolls, a cylinder adjustable relatively to said rolls and arranged parallel therewith, a roller adjustable in unison with said cylinder and arranged contiguous thereto, an endless conveyer having one end passing around said roller and being thereby held against said cylinder, means for taking up the slack in said conveyer, and means for driving said cylinder, conveyer and rolls in unison.

11. In a machine for making paper-board, the combination of a pair of rolls, means for conducting the web to the meeting peripheries of said rolls, a cylinder adjustable relatively to said rolls and arranged parallel therewith, a roller movable in unison with said cylinder, a cushion for pressing said roller toward said cylinder, an endless conveyer passing around said roller and being thereby held against said cylinder and extending to a point contiguous to said rolls, and means for driving said rolls and conveyer in unison.

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