Dec. 29, 1931. K. H. TOMTLUND 1,838,200

PNEUMATIC SHEET LAYING-OFF DEVICE

Filed Feb. 19, 1929 3 Sheets-Sheet 1

Fig. 1.

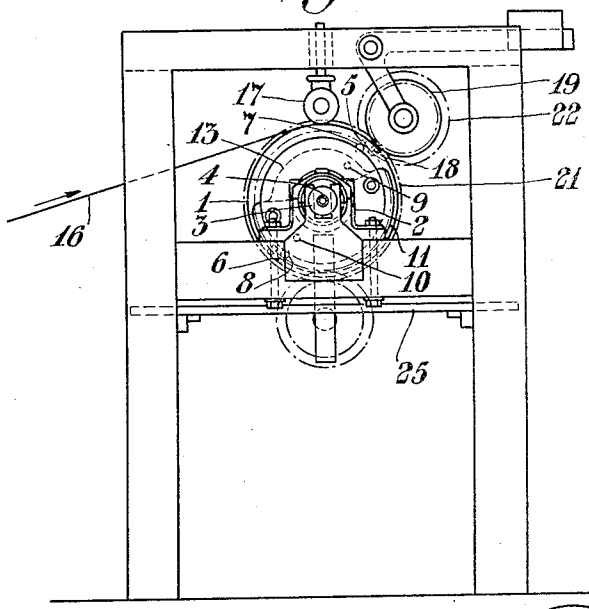
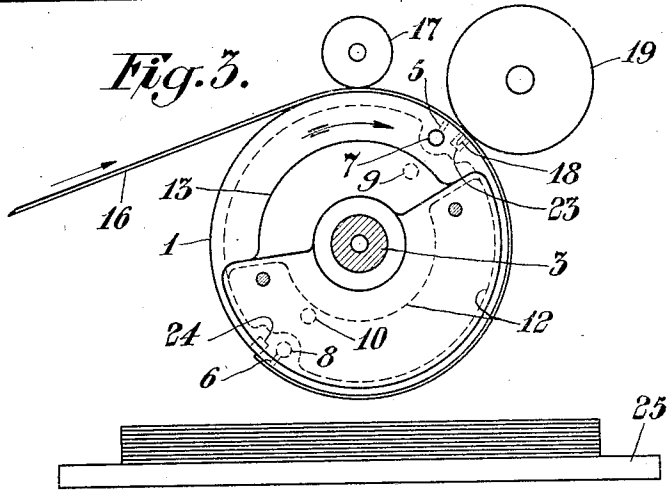


Fig. 3.



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Filed Feb. 19, 1929 3 Sheets-Sheet 2

Fig. 2.

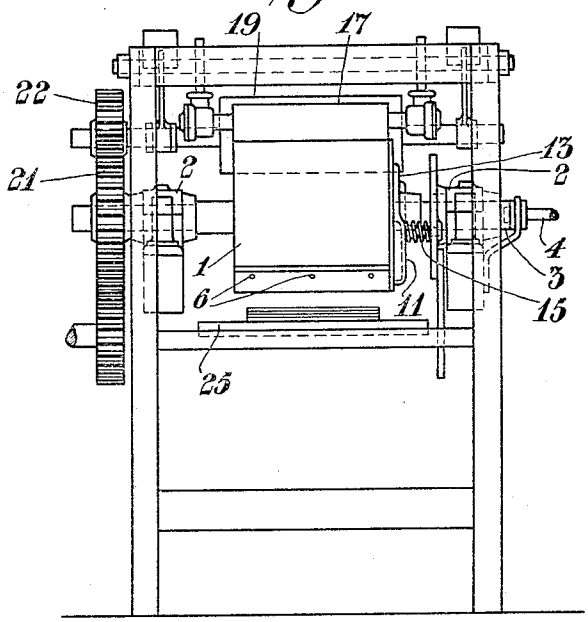
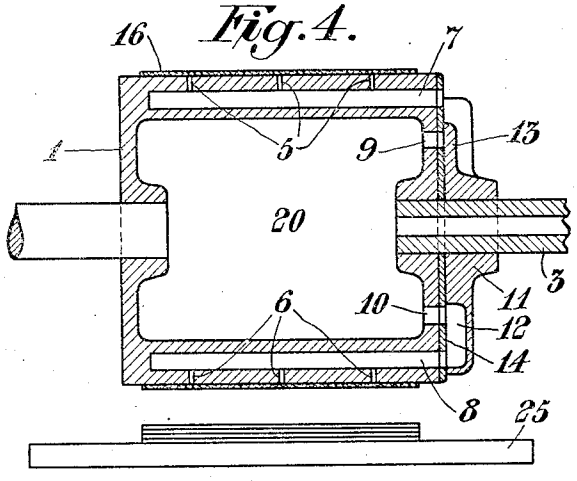


Fig. 4.



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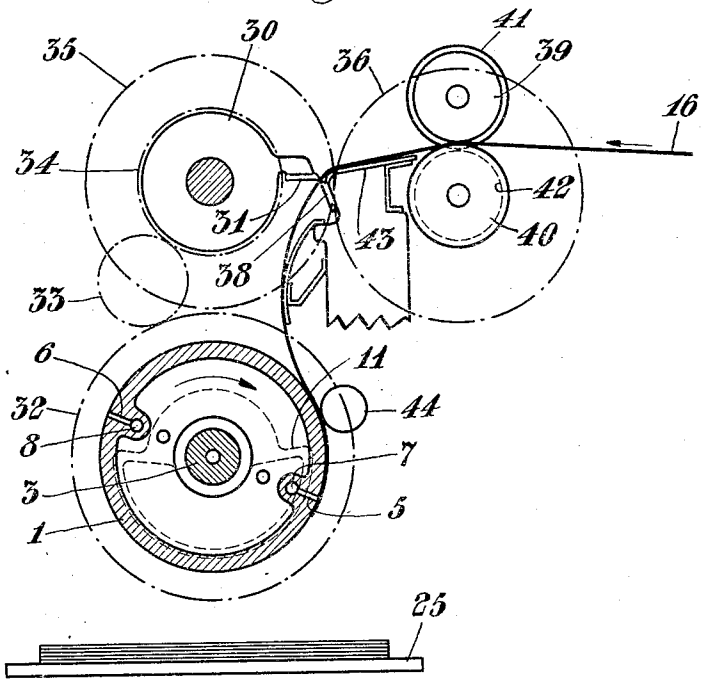
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Filed Feb. 19, 1929 3 Sheets-Sheet 3

Fig. 5.



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UNITED STATES PATENT OFFICE

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PNEUMATIC SHEET LAYING-OFF DEVICE

Application filed February 19, 1929, Serial No. 341,122, and in Sweden December 6, 1927.

The present invention relates to improvements in pneumatic sheet laying-off devices for paper machines or the like. Such devices operate to catch and hold the sheet or sheets cut off from the paper web produced in the machine and to lay off such sheet or sheets at the desired place. The device may consist of a rotary roll or drum, and the sheet catching and holding means may consist of holes in the surface of the drum, and of means for alternately putting said holes in communication with a vacuum or suction conduit so as to catch and hold the sheets by suction through said holes, and with the outside air so as to relieve the suction and release the sheets.

According to the present invention the drum is provided with an interior chamber which is in constant communication with the vacuum or suction conduit and is thus always under vacuum, and with one or more passageways which communicate with the holes or apertures in the shell of the drum, which latter is also provided with a valve which is arranged in such manner that during the rotation of the drum the passageway or passageways are alternately put in communication with said interior vacuum chamber in the drum and with the atmosphere.

By this arrangement the advantage is attained that the vacuum is completely relieved only in the passageways communicating with the holes or apertures in the shell of the drum, whereas the interior chamber, which has a comparatively large volume in relation to the passageway or passageways, forms a vacuum reservoir.

Accordingly, when the passageways are shut off from communication with the atmosphere and are instead put in communication with the interior chamber of the drum, the vacuum drop in the passageway or passageways—which may have a length of several meters—becomes very small and the suction required for catching and holding the sheet to the drum is set up practically instantaneously.

In the accompanying drawings two embodiments of the invention are illustrated. Fig. 1 shows a sheet laying-off device viewed towards one end of the laying-off drum. Fig. 2 shows the device viewed from the left in Fig. 1. Figs. 3 and 4 show to a larger scale the laying-off drum viewed towards one end and in axial section, respectively. Fig. 5 is a diagrammatic and partly sectional view of a second embodiment.

Referring to the embodiment illustrated in Figs. 1 to 4, inclusive, the laying-off device consists of a drum 1 having a hollow interior which forms a suction or vacuum chamber 20. Said drum is journalled in bearings 2 and communicates through its hollow trunnion 3 with a vacuum or suction conduit 4. The shell of the drum 1 is provided along two diametrically opposite generatrices with two groups of holes 5 and 6.

Each of these two groups of holes 5 and 6 communicates with a passageway 7 and 8, respectively, provided in the shell, said passageways being open at one end of the drum.

Said end wall of the drum 1 is provided with two ports 9 and 10 located on the same diameter as the passageways 7 and 8 but closer to the axis of the drum. Adjustably mounted on the hollow trunnion 3 adjacent said end wall of the drum 1 is a distributing valve 11 having a sector-shaped cavity 12 directed towards the drum and adapted to put the passageway 7 in communication with the port 9, or the passageway 8 in communication with the port 10. Said valve 11 also has a sector-shaped portion or plate 13 diametrically opposite the cavity 12 and adapted to close the port 9, or 10, when during the rotation of the drum 1 the passageway 7, or 8, moves out of the cavity 12 and thus obtains communication to the atmosphere. Secured to the end of the drum 1 directed towards the valve 11 is a wear plate 14 of suitable metal, said plate having holes corresponding to the orifices of the passageways 7 and 8 and to the ports 9 and 10. The valve 11 is forced against the wear plate 14 by two coil springs 15 interposed between the valve 11 and the adjacent bearing 2, as shown in Fig. 2.

The paper web 16 runs between the drum 1, which rotates in the direction indicated by the arrow in Fig. 3, and a roller 17 cooper-

ating with the drum 1, after which the web runs in between the drum 1 and a roller 19 provided with a knife 18 which extends across the entire width of the paper web. Said roller 19 is geared to the drum 1 by gears 21, 22 in such manner that the roller 19 makes two revolutions for each revolution of the drum 1. and so that at each revolution of the roller 19 the knife 18 enters one of two grooves 23 and 24 provided diametrically opposite each other in the surface of the drum 1.

For each revolution of the roller 19 the knife 18 will thus cut off a piece or sheet from the paper web of a length equal to one-half of the periphery of the drum 1. Before the sheet is cut off its forward edge, i. e. the forward edge of the paper web is caught and held to the surface of the drum 1 by suction, for instance through the holes 6, and the web will thus follow the drum 1 while the sheet is cut off and until the orifice of the passageway 8 moves out from under the valve 11 and comes in communication with the atmosphere, when the suction through the holes 6 is relieved and the sheet drops on to the table 25 below the drum 1. Immediately before the passageway 8 is put in communication with the outside air, the orifice of the passageway 7 enters the cavity 12 of the valve 11, so that suction is set up in the holes 5 by said passageway 7 coming in communication with the suction or vacuum chamber 20. The front edge of the paper web is thus again held on to the surface of the drum 1, and when during the rotation of the roller 19 the knife 18 again strikes the web, a second sheet is cut off which is soon afterwards laid off in the manner above described.

Instead of putting the holes 5 and 6 in communication with the atmosphere for the purpose of laying-off the sheet, said holes may be put in communication with a compressed air supply in any suitable manner, for instance by providing the valve 11 with a chamber or cell connected to a compressed air conduit, so that when the passageway 7 or 8 comes in register with such cell, the sheet is blown off from the laying-off drum.

The embodiment illustrated in Fig. 5 differs from the embodiment above described mainly in that the laying-off drum 1 does not form a portion of the cutting-off device. According to this embodiment the knife 31 is attached to a rotatably journalled roller 30 which is geared to the laying-off drum 1 by means of a train of gears 32, 33, 34 in such manner that said roller 30 makes two revolutions for each revolution of the drum 1. The knife 11 does not cooperate with the laying-off drum 1, however, as in the embodiment above described, but with a stationary knife 38. The roller 30 is geared by means of gears 35, 36 to two rollers 39 and 40 in such manner that the roller 30 makes one revolution for each revolution of the roller 40. The roller 39 is provided with a circular knife 41 which enters an annular groove 42 in the circumference of the roller 40 and cuts the paper or pulp web 16 longitudinally.

The paper or pulp web 16 runs in between and is cut longitudinally between the rollers 39 and 40 and thence over a guide plate 43 and the stationary knife 38 and drops by gravity on to the laying-off drum 1 which runs in the direction indicated by the arrow. The forward edge of the paper web runs in between the laying-off drum 1 and a roller 44 bearing against said drum, and is attracted and held to the laying-off drum 1 when the passageway 7 connected to the holes 5 moves in under the valve plate 11. The laying-off drum 1 is geared to the roller 30 in such manner that the knife 31 passes the stationary knife 38 and cuts off the sheet only after the forward end of the latter has been attached to the drum 1 in the manner above described.

The sheet cut off is now brought along by the drum 1 until the passageway 7 moves out from under the valve plate 11, so that the suction in said passageway is relieved and the forward end of the sheet is released from the laying-off drum. Shortly before this happens the rear edge of the sheet has passed the roller 44 and is thus free, so that when the forward end of the sheet is released from the laying-off drum 1, the sheet will drop on to the desired place on the table 25. In the two embodiments above described the forward edge of the paper web is thus held to the laying-off drum before the sheet is cut off, and the sheet is also held during a certain portion of the revolution of the laying-off drum, so that the sheet will be laid off at the desired place, and all sheets will form an even pile, as shown in Figs. 3 and 5.

The invention is, of course, not limited to the embodiments above described and illustrated in the drawings the details of which may be modified in several respects without departing from the principle of the invention.

I claim:

1. In a sheet laying-off device for paper machines and the like, the combination of a rotary drum, the interior of said drum constituting a vacuum chamber, said drum having at least one passageway opening in one end surface of the drum and communicating with holes opening in the circumferential surface of said drum, said drum having at least one port in its said end surface leading to said interior vacuum chamber, and a valve bearing against said end surface of said drum, said valve being adapted during a portion of a revolution of said drum to effect communication between said port and said passageway and during another portion of a revolution of said drum to close said port

and open said opening of said passageway to the outside air.

2. In a sheet laying-off device for paper machines and the like, the combination of a rotary drum, the interior of said drum constituting a vacuum chamber, said drum having at least one passageway opening in one end surface of said drum and communicating with holes opening in the circumferential surface of said drum, said drum having at least one port in its said end surface leading to said interior vacuum chamber, and a valve bearing against said end surface of said drum, said valve having a cavity adapted during a portion of a revolution of said drum to effect communication between said port and said passageway.

3. In a sheet laying-off device for paper machines and the like, the combination of a rotary drum, the interior of said drum constituting a vacuum chamber, said drum having at least one passageway opening in one end surface of said drum and communicating with holes opening in the circumferential surface of said drum, said drum having at least one port in its said end surface leading to said interior vacuum chamber, and a valve bearing against said end surface of said drum, said valve having a cavity adapted during a portion of a revolution of said drum to effect communication between said port and said passageway, and said valve having a plate adapted to cover said port during the remaining portion of a revolution of said drum.

4. In a sheet laying-off device for paper machines and the like, the combination of a rotary drum, the interior of said drum constituting a vacuum chamber, said drum having a number of passageways equally spaced circumferentially and communicating with holes opening in the circumferential surface of said drum, said passageways opening in one end surface of said drum, a corresponding number of ports in said end surface of said drum leading to said interior vacuum chamber, and a valve bearing against said end surface of said drum, said valve having a cavity adapted during a portion of a revolution of said drum to establish connection between said passageways and their corresponding ports, and said valve having a plate adapted to cover such ports as are not in communication with said cavity.

5. In a sheet laying-off device for paper machines and the like, the combination of a rotary drum, the interior of said drum constituting a vacuum chamber, said drum having a number of passageways equally spaced circumferentially and communicating with holes opening in the circumferential surface of said drum, said passageways opening in one end surface of said drum, a corresponding number of ports in said end surface of said drum leading to said interior vacuum chamber, said ports being located substantially radially inside the openings of the corresponding passageways in said end surface, and a valve bearing against said end surface of said drum, said valve having a cavity adapted during a portion of a revolution of said drum to establish connection between one of said passageways and its corresponding port, and said valve having a plate adapted during such portion of a revolution to cover the other of said ports in said end surface and to allow communication between the other of said passageways and the outside air.

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