Dec. 17, 1935. G. SPIESS 2,024,544

PNEUMATIC CONTROL DEVICE

Filed Aug. 4, 1934 2 Sheets-Sheet 1

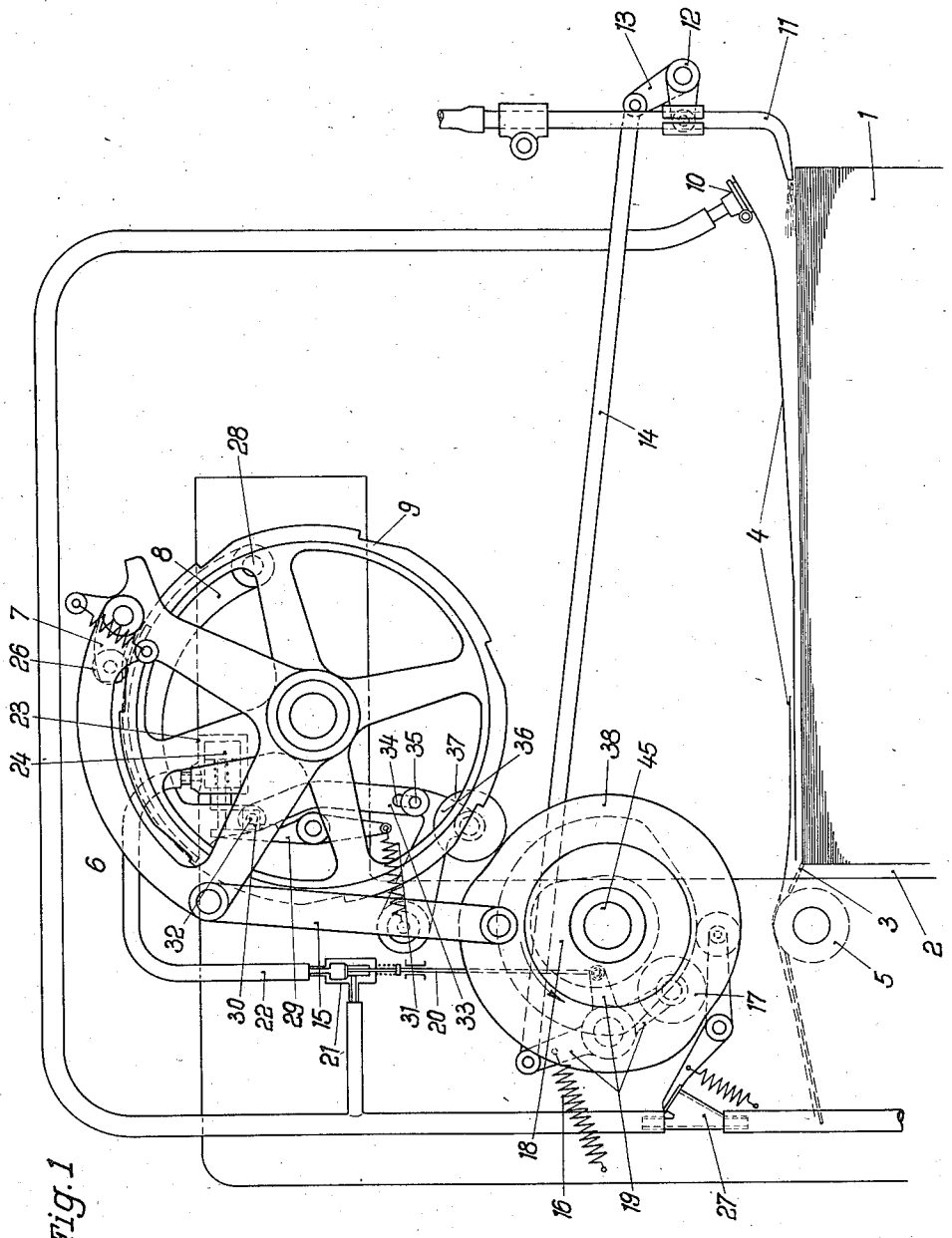


Fig. 1

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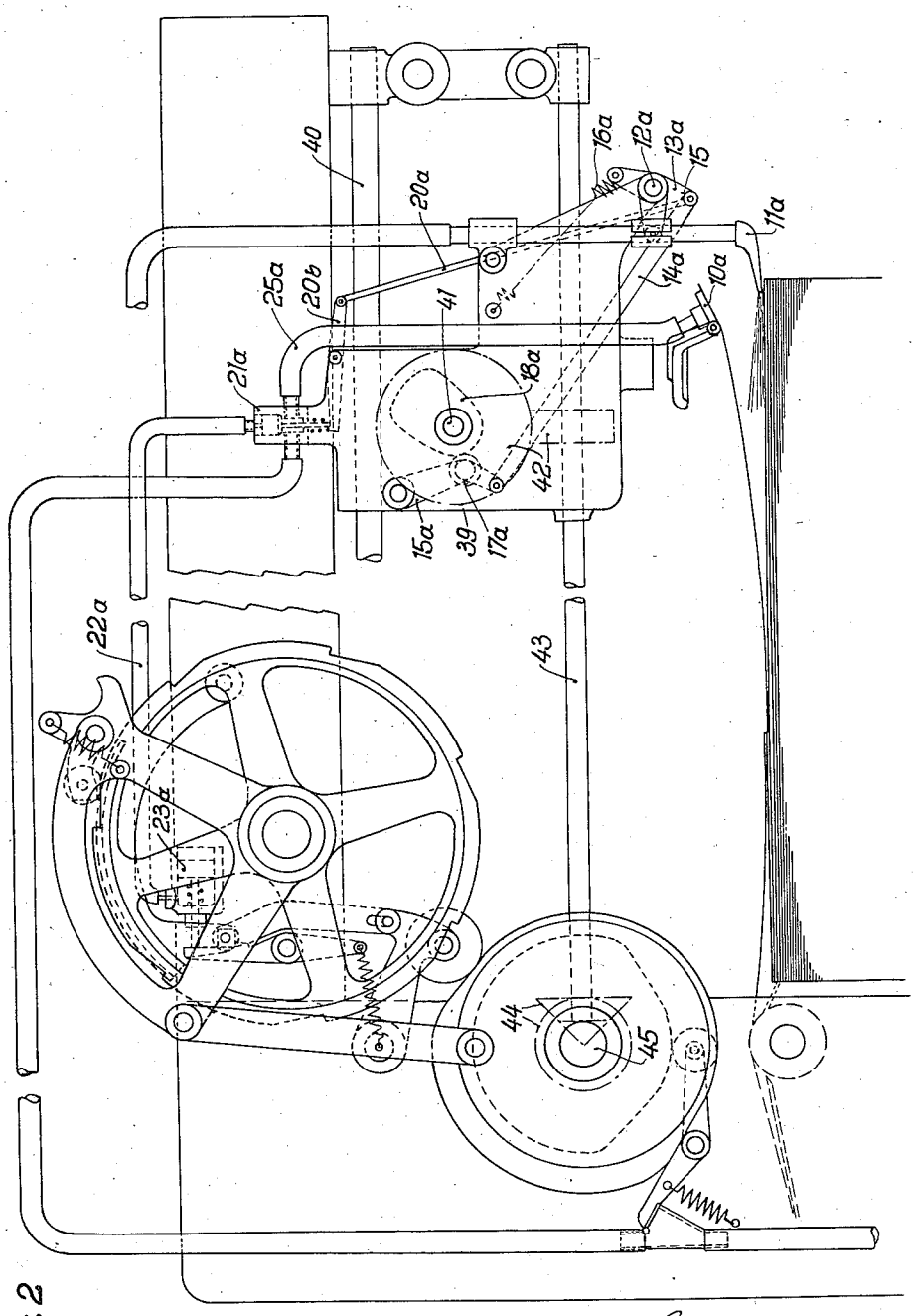


Fig. 2

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UNITED STATES PATENT OFFICE

2,024,544

PNEUMATIC CONTROL DEVICE

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Application August 4, 1934, Serial No. 738,565
In Germany August 5, 1933

2 Claims. (Cl. 271—62)

This invention relates to a device for controlling the conveying of the pile for sheet feeders by means of a suction device comprising a cylinder and a piston. The stationary portion of the device is connected with an air suction piping, whereas the movable portion thereof, according to the opening or closing of a regulating aperture in the suction piping at a certain moment during a sheet separating operation, is differently adjusted at that moment and thus starts or stops the conveying of the pile according to its adjustment.

A device of this type for controlling the conveying of an adjusted sheet pile to the sheet separating means of a feeder has been proposed already. In this known device the control opening of the suction piping is arranged in the pile support so as to be covered or released by the front end of the pile when the latter recedes owing to the removal of the sheet or is advanced again by the pile conveying means. When the control opening is closed, the movable portion of the sniffle device, owing to the vacuum produced in the suction piping, will occupy a position involving the stopping of the pile conveying device, e. g., of a pawl locking mechanism, while, when the control opening is open, the movable portion of the sniffle device will, under spring tension occupy a position involving the starting of the pile conveying means, the change from one position to the other depending solely upon the opening or closing of the control opening in the suction piping by the pile at the moment of control.

Compared with the known art, the invention provides that the hollow space of the sniffle cylinder is connected with the piping of the suction device separating the sheets from the pile and that the suction piping of the sniffle cylinder contains a control opening which, according to the height or position of the pile, is closed or opened at a certain moment in the course of a sheet separating operation and thus causes the necessary air pressure in the sniffle cylinder for starting or stopping the pile conveying means. The device according to the invention may be arranged so as to have the starting and stopping of the conveying means correspond, respectively, to the opening and closing of the control opening, or vice versa.

As control opening may serve the separating suction nozzle itself and as controlling means influenced by the height or position of the pile for closing or not closing the control opening the sheet to be aspirated which, according to the height or position of the pile, sooner or later is drawn up to the suction nozzle so as to close it at the proper moment when the pile is high or advanced enough or, in the other case, to leave it open.

It is, however, preferable to relieve the separating suction nozzle from the task to act as regulating opening for the pneumatic control of the pile motion and restrict its function solely to the separation of sheets. For this reason the invention provides a special control opening in the suction piping leading to the sniffle cylinder and a shut-off member for this opening, which is controlled by a feeler testing in known manner the height or position of the pile between two separating operations and which closes or opens the control opening according to the height or position of the pile, or establishes or interrupts the connection of the sniffle cylinder with the suction piping of the separating suction device. The testing of the sheet pile goes on during the periods when the separating suction device has aspirated a sheet and vacuum prevails in the suction piping owing to the closing of the nozzle. The feeler can thus be combined with the blast which effects the separation of the aspirated sheet from the pile and, according to the invention, is combined therewith in such a way that the blast serves also as pile feeler and holds the following sheets in position.

Compared with the known control devices, in which a pile feeler, by means of rods, acts directly on the pile conveying device, the pneumatic transmission of the feeler action to the control mechanism for the pile transport, as provided by the invention, affords the advantage that the power available in the form of the suction pressure in the separating suction piping is utilized for reversing and the feeler has to adjust only a light valve. Furthermore, according to the invention, greater distances between the separating device, near which the feeler is preferably disposed, and the control device for the pile transport can be negotiated without bothersome rods, and the separating device may be adjusted. These advantages will become especially apparent when the sheets are separated from the pile with their rear edge, as the various sheet sizes require the adjustability of the entire separating device including the feeler. The invention affords a possibility of combining the control opening and the feeler with the separating sucker into an adjustable unit which is not interfered with by the pneu-

matic connection of the control opening with the snifting cylinder on the one hand and the separating suction piping on the other by a telescopic piping or flexible tubing.

By way of example, two embodiments of the invention are illustrated in the accompanying drawings which are restricted to showing the parts of a feeder required for understanding the invention and in which Figure 1 is a view of one constructional embodiment and Fig. 2, a view of the other embodiment.

Referring to the drawings, the vertically stacked sheet pile 1 abuts with its front surface against the guides 2 to the upper ends of which the transport bridge 3 is secured over which the sheet 4 is passed to the roller 5 which in known manner conveys the sheet 4 to the feeding point with the aid of pressure rolls, not shown. The sheet 4 is separated from the pile at its rear edge by a separating suction device 10 which tilts the aspirated sheet portion and lifts it off from the pile to a certain extent. The mode of operation as well as the means for controlling the separating device are known and do not form an object of the invention. For this reason, they are not illustated in Fig. 1 which shows only an air piping leading from the suction device 10 to an air pump, not shown, and being designated 25.

To effect the complete separation of the sheet from the pile after the rear edge thereof has been raised by the suction device 10, air is blown between the raised sheet portion and the pile of remaining sheets by a blast 11 which is controlled so that after the raising of the rear edge of the sheet it will swing into the gap between the lifted sheet and pile and swing back before another sheet is to be separated.

This blast control is known also and the device required for it is therefore illustrated only in so far as has to do with the invention. The blast carries out a motion composed of an up and down motion and a swinging motion. The vertical part of the blast pipe 11 is for this purpose movably attached to the end of one arm of a bell crank 13 oscillatorily arranged at 12. The other arm of the bell crank 13 is articulated by a rod 14 to one arm of a three-armed lever 19 movably disposed on the feeder frame and acted upon by a tension spring 16 which with its other end is secured to the feeder frame. The spring 16 acts upon the rods 19, 14, 13 to move down the blast 11 and cause it to rest on the top surface of the pile 1. This motion of the rods 19, 14, 13 under the tension of the spring 16 is regulated by a cam plate 18 disposed on a single revolution control shaft in the feeder frame and acting with its curved circumference upon a roller 17 rotatably disposed on the second arm of the three-armed lever 19. The cam plate 18 and the tension spring 16 thus jointly regulate the up and down motion of the blast 11 in the course of a sheet separating operation.

The third arm of the three-armed lever 19 is articulated by a rod 20 to a valve 21 which is arranged in a branch air piping 22 turning off from the separating suction piping 25 and leading to a snifting cylinder 23 secured to the feeder frame. The cam plate 18 or the surface of the pile limit the downward motion of the blast 11. If the latter is prematurely stopped by the pile during its downward motion, the valve 21 will not be in open position and the snifting piston 24 disposed in known manner under spring tension in the snifting cylinder 23 will not be displaced, but remain in the position which it occupies in response to spring tension. On the other hand, if the pile falls below, more or less, a certain height, the greater stroke of the blast 11 acting as pile feeler will cause the control valve 21 to be lifted more or less from its seat and thus place the inside of the cylinder 23 under the suction pressure of the separating suction piping 25 whereby a displacement of the snifting piston 24 to the other end position will be effected. The change in the position of the snifting piston causes in known manner the actuation of the ratchet gear of the pile transport. The front end of the piston rod projecting from snifting cylinder 23 strikes and moves to the left a locking lever 29 (Fig. 1) whose locking nose is thereby withdrawn from under a locking projection 30 of a control path 8 articulated at 28 to the feeder frame and preventing in its operating position a pawl 7, whose roll 26 moves over the path 8, from engaging the teeth of the feed gear wheel 9. The pawl 7 is articulated to a sector-like feed lever 6 which, by means of the articulated rod 15, is driven from a crank disc 38 so as to swing periodically to and fro. When the nose of the locking lever 29 is withdrawn from under the projection 30 of the control path 8, the free end of the latter will drop down somewhat and thus permit the pawl 7 to engage the wheel 9 which is thereby moved and caused to raise the pile table to a certain extent in known manner by means of screw spindles, chains or racks, not shown.

By means of a pin 32 a link bar 33 is articulated to the free end of the control path 8 and connected at the other end by means of the slot 34 and a pin 35 with a roll arm 36 whose roll 37 moves on the circumference of the crank disc 38 constructed as cam plate which, at the proper time, will raise the lowered path 8 into operative position which is secured by the mutual engagement of the nose of the locking lever 29 tensioned by the spring 31 and the locking projection 30. The pawl 7 is thus prevented again from engaging the teeth of the feed wheel 9, the engagement taking place only after the valve 21 has been opened again by a corresponding lowering of the blast 11 and the snifting cylinder 23 has been subjected to the suction pressure of the separating suction piping.

After the feed wheel 9 has been moved once and before the initial setting has been reestablished the vacuum in the snifting cylinder 23, simultaneously with the vacuum in the separating suction piping 25, is eliminated by the positively and correctly timed opening of a fresh air valve 27 in the piping 25. The fresh air valve 27 is opened when the sheet to be fed has reached the roller 5 for the purpose of separating the sheet from the separating sucker 10.

In the construction shown in Fig. 2 the entire separating device including the feeler and blast 11*a* is arranged on a pedestal body 39 which is displaceably and fixably disposed on a carrier 40 in the feeding direction of the sheets. On the body 39 the regulating valve 21*a* is positioned whose casing is connected with the piping 22*a* leading to the snifting cylinder 23*a*. At 12*a* the lever 13*a* is disposed which controls the pile feeler 11*a* constructed as blast and which is articulated by the rod 14*a* to the free end of the roll lever 19*a* whose roll 17*a* is drawn by a spring 16*a* engaging the lever 13*a* to the circumference of the cam plate 18*a*. The latter is located on a control shaft 41 disposed in the

body **39** and driven by the worm gear **42** from a shaft **43** extending in the direction of the sheet feed. The shaft **43** is driven by means of the bevel gears **44** from the main driving shaft **45**.

The lever **13***a* is articulated by a rod **20***a* to a two-armed lever **20***b* articulated to the pedestal body **39**. The free end of the lever **20***b* extends below the spindle of the regulating valve **21***a* held in locking position by spring power.

The mode of operation of this device is exactly the same as that of the construction described above.

I claim:—

1. A pneumatic device for controlling the pile transport for sheet feeders comprising a suction head, a suction pipe leading from said head, a control valve for said pipe, a feeler independent of said head and adapted to engage the top of the remaining pile upon lifting of the top sheet from the pile, and means operatively connecting the valve with the feeler and arranged to raise the valve upon the feeler moving below normal position.

2. A pneumatic device for controlling the pile transport for sheet feeders comprising a suction head, a suction pipe leading from said head, a control valve for said pipe, a feeler independent of said head and adapted to engage the top of the remaining pile upon lifting of the top sheet from the pile, means operatively connecting the valve with the feeler and arranged to raise the valve upon the feeler moving below normal position, said feeler forming a blast nozzle, and means to supply fluid under pressure to said feeler.

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