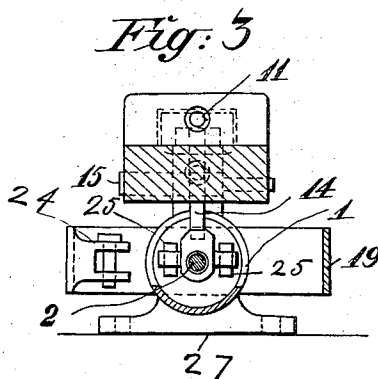
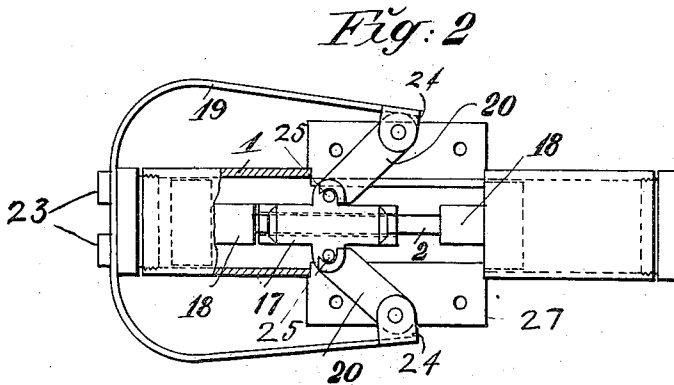
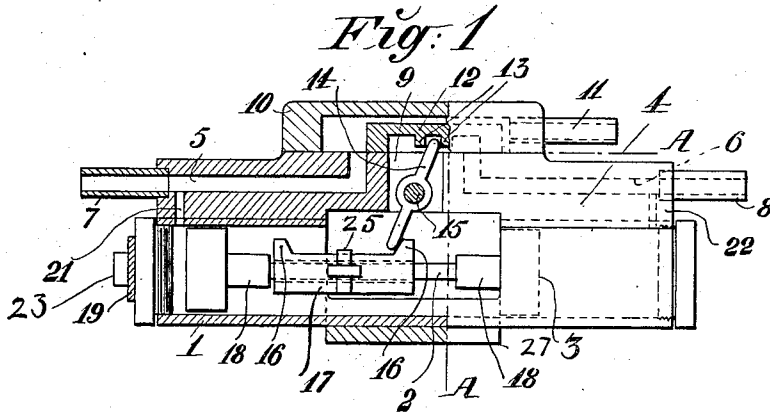


K. I. LINDSTRÖM.
PNEUMATIC VALVE MECHANISM.
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Patented Aug. 30, 1910.



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PNEUMATIC-VALVE MECHANISM.

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Specification of Letters Patent. Patented Aug. 30, 1910.

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To all whom it may concern:

Be it known that I, KNUT IVAR LINDSTRÖM, proprietor, a subject of the King of Sweden, residing at Nykvarn, in the Kingdom of Sweden, have invented certain new and useful Improvements in Pneumatic Valve Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to mechanism for reciprocating the slide valve, thereby shifting the action of the air or suction as the case may be in such manner as will reciprocate the pistons in such mechanism, of which the ordinary rock drill, milking machine and other pneumatic hammers are good examples.

This invention relates more particularly to means for instantaneously throwing the valve slide from one position to another, thus changing, at each change of position of the slide, the direction of motion of the pistons and is shown in the present application applied to milking machinery, or is so described hereafter, also being described in connection with a pressure current of air, but of course a suction would serve the same purpose.

The chief object is to provide means for instantaneously throwing the slide, another among others is to provide an air cushioning effect between the ends of the pistons and the far ends of the cylinders, all of said objects being accomplished by the construction and combinations of parts hereinafter more particularly set forth and claimed.

In the accompanying drawings: Figure 1 represents a view in side elevation, partly in section, of a device embodying my invention; Fig. 2, a top plan view of the same, partly in section; and Fig. 3, a sectional view of the same on line A—A of Fig. 1.

1 designates the double cylinder in which the pistons 3 reciprocate.

3 designates the pistons reciprocating in said double cylinder and connected by a piston rod 2 on which are mounted the collars or shoulders 18 and a slidable part 17, this part being provided with two studs 25 projecting both above and below and arranged one on each side of the middle of said part; the collars or shoulders 18, above referred to, limiting the movement of said slidable part 17 on said piston rod 2.

4 designates a casing arranged on top of double cylinder 1 and provided with channels 5 and 6 which communicate with outlet pipes 7 and 8 respectively, said casing 4 being further provided with the opening 9 and most of passageways 21 and 22, which in turn communicate with outlets 7 and 8 respectively. These passageways 21 and 22 extend down through the bottom of casing 4 and through the top of casing 1, communicating with the interior of the cylinders near their far ends.

10 designates the casing for slide-valve 12 and is mounted on top of casing 4 in such manner that its interior communicates with channels 5 and 6.

11 designates the pressure pipe passing through the end of, and secured in any suitable manner in, said casing 10 and communicating directly with the interior thereof. Of course a suction pipe could be substituted as before mentioned without avoiding the invention.

The slide 12 above referred to is provided with two lugs 13 on its under side, one on each side, and both at an equal distance from, the middle thereof.

14 designates a pivoted arm mounted in, and half way between the ends of casing 4, and half way between the two cylinders 1 and having its upper end arranged between and to engage the lugs 13 of slide-valve 12 and its lower end adapted to be engaged by lugs 16 of slidable part 17 for reciprocating said slide to cover and uncover the openings of channels 5 and 6 (see Fig. 1). 15 designates the pivot on which said arm 14 is mounted.

19 designates a U-shaped spring under compression secured by screws 23 or other suitable means to the end of one of the cylinders (see Fig. 2) and provided with perforated lugs 24 at its ends (see Figs. 2 and 3).

20 designates two links, one pivoted to each end of said spring 19 and engaging with its other end the corresponding stud 25, above referred to (see Figs. 1 and 2) the inner ends of said links being curved in concave form to provide a bearing so that said links may swing from one position to the other in regard to said studs 25 without slipping from engagement with the same. The spring 19 being of U-shape as above explained and the links being attached to the ends of said spring and engaging said

pins or studs 25, it will be put under compression as soon as the slidable part 17 has reached its central position of travel; as soon as this point is passed the end of the spring will contract, for the links will no longer be standing at right angles to said slidable part, and in so contracting they will force the links to fold either toward or from it, as the case may be (see Fig. 1) and in such folding the links will force the slidable part either to one end or the other of its travel instantaneously (see Fig. 1). In such travel the lugs 16 of part 17 will of course engage the lower end of arm 14 and throw the slide-valve in the opposite direction of travel, thus forming communication with the channels and passageway not in use in the previous movement, thus letting air into the cylinder before the end of the piston reaches the end of said cylinder and thereby forming an air cushion for the same and at the same time shutting off the air from the channels and passageway in use in the previous action.

27 designates the stand upon which the cylinders are mounted.

The operation is as follows: The air under pressure is admitted through pressure pipe 11, the slide, pistons and slidable part being in the position shown in Fig. 1, it then passes through casing 10 into and through channel 5, where some of it passes through passage 21 and the rest, most of it, passes through the outlet pipe 7 to the apparatus to be actuated, the air being cut off from channel 6 by slide 12. The air passing through passageway 21 is in the meantime gradually forcing the pistons 3, and through the left hand shoulder 18, the slidable part 17 and studs 25 to the right, thus gradually expanding the ends of the spring 19 through the links 20 and thus putting the U-shaped spring 19 under compression, said spring not being of sufficient strength to prevent such movement of the pistons. As soon as the studs 25 have passed the middle point of their travel the dead point of the spring 19 will have been passed and its ends will then contract, throwing part 17, lugs 25 and the links 20 to the right and through lug 16 on the left-hand end of part 17, arm 14 and lugs 13 throwing the slide-valve to the left, thus cutting off the air supply to channel 5, outlet pipe 7 and passageway 21 by covering the end of channel 5 and at the same time uncovering channel 6, thus supplying channel 6, pipe 8 and

passageway 22 with air. This will of course introduce air into the end of the right-hand cylinder between the end of said cylinder and the end of the piston thus forming an air cushion for the same. As soon as the right-hand piston is forced to a certain point to the left the reverse action on the part of the slide, slidable part 17, and links 20 will take place.

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

1. In combination, a slide valve for pneumatic apparatus, a double cylinder, two pistons working in said double cylinder, a rod connecting said pistons, a part slidably mounted on said rod, said part having a lug on top near each end and a stud on each side of the middle of and projecting above and below said part, a spring under pressure, links pivoted at one end to the ends of said spring and having their other ends recessed to engage said studs respectively, said links swinging in relation to said studs and increasing or decreasing the compression of said spring according to the position they occupy in relation to a right angle.

2. In combination with a slide valve for pneumatic apparatus, a double cylinder, two pistons working in said double cylinder, a rod connecting said pistons, a part slidably mounted on said rod, and provided with lugs for operating the valve, a spring, and pivotal connections between the said slidable part and the ends of said spring, the above mentioned devices being arranged and adapted to increase or decrease the resilient action of said spring according to the changes of position of said pivotal connections substantially as set forth.

3. In combination with a slide valve and a pair of cylinders having their piston rods connected, a part sliding on the means of connection of said rods and adapted to reciprocate said valve, a U-shaped spring and connections between said part and the ends of said spring whereby the change of angle of said connections will vary the resilient action of said spring substantially as set forth.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

KNUT IVAR LINDSTRÖM.

Witnesses:

NORVALD NYSTRÖM,
HARRY ALBILM.