May 13, 1924. 1,493,650

G. D. SUNDSTRAND

RUBBING MACHINE

Original Filed July 17, 1920 2 Sheets-Sheet 1

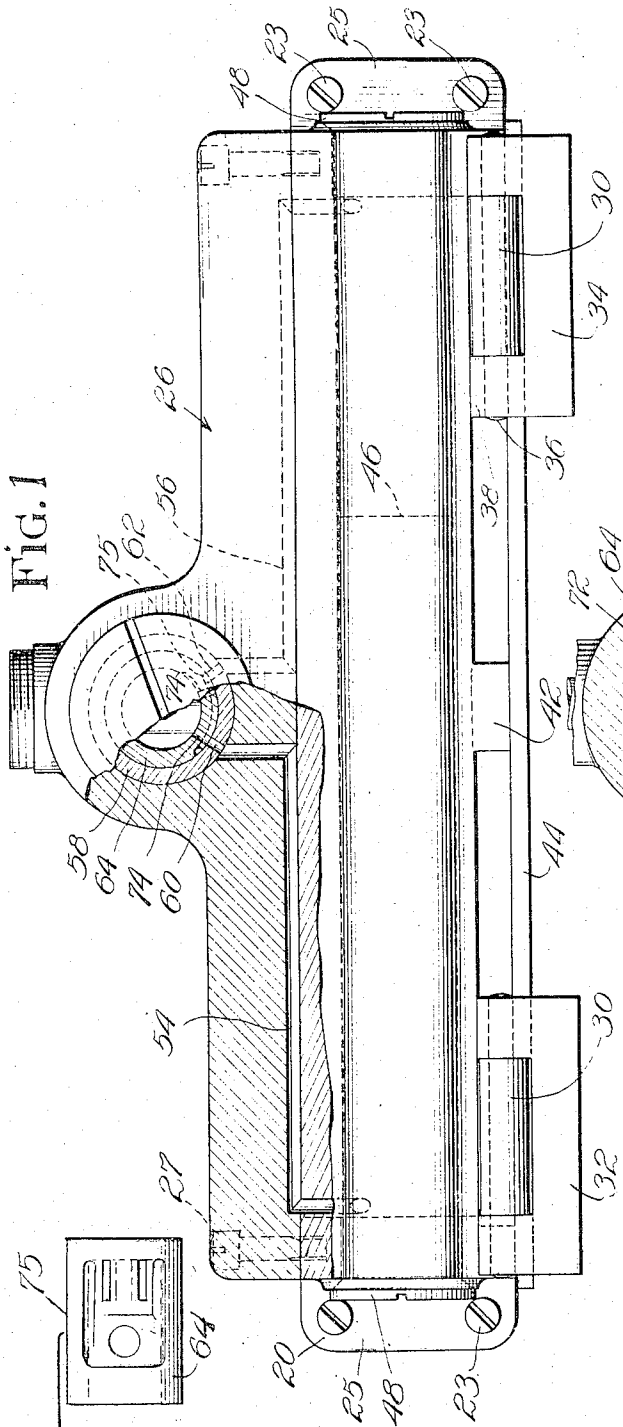


Fig. 1

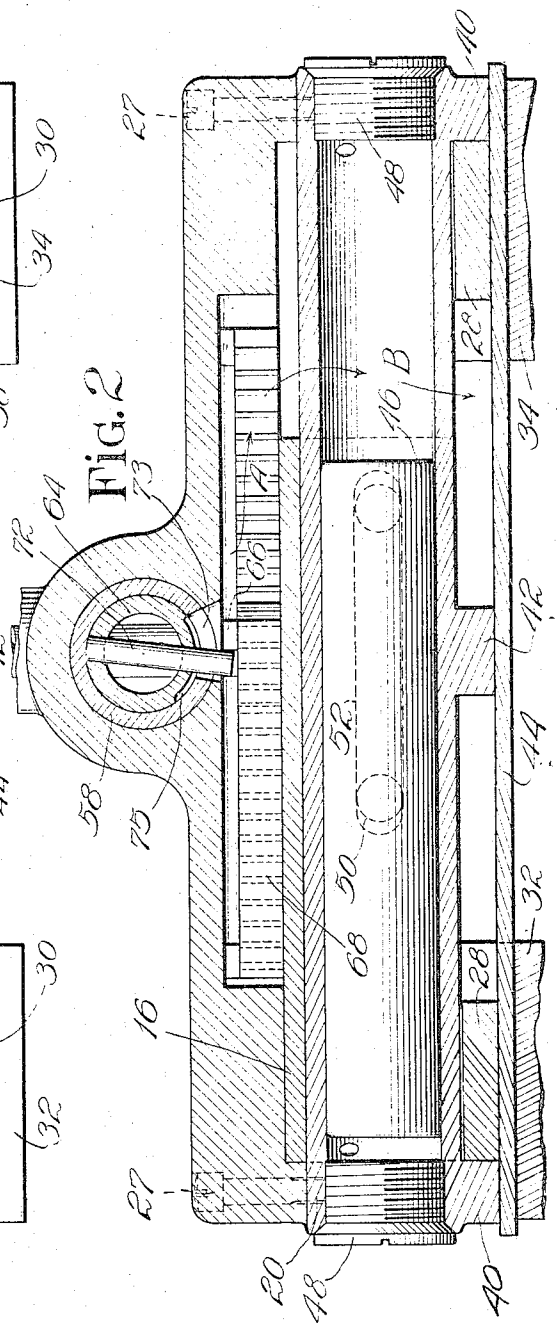


Fig. 2

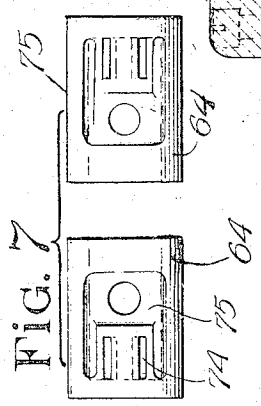


Fig. 7

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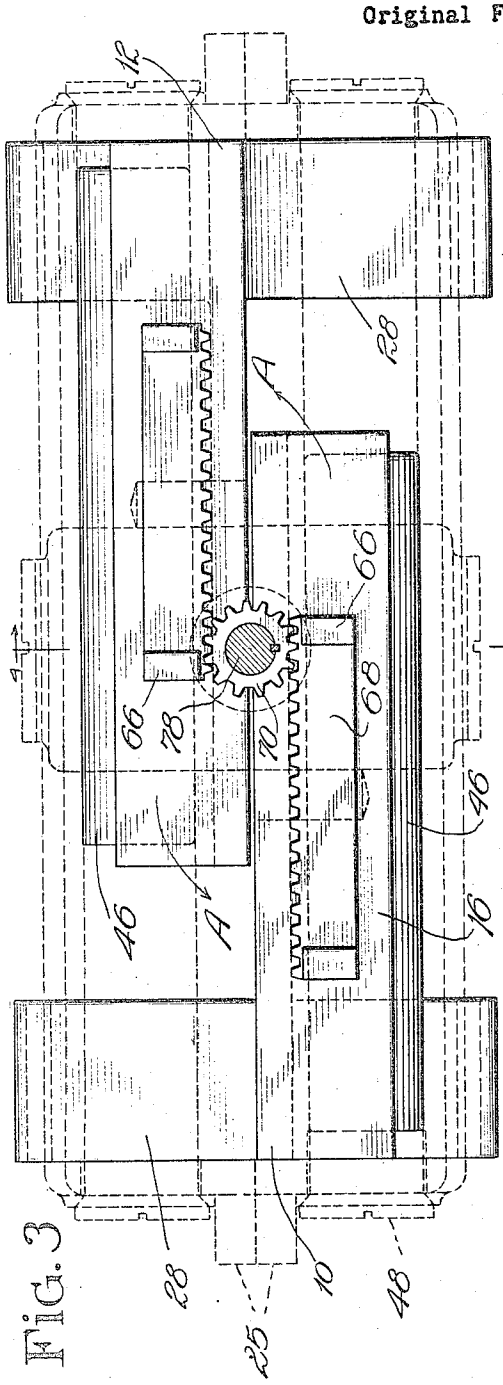


Fig. 3

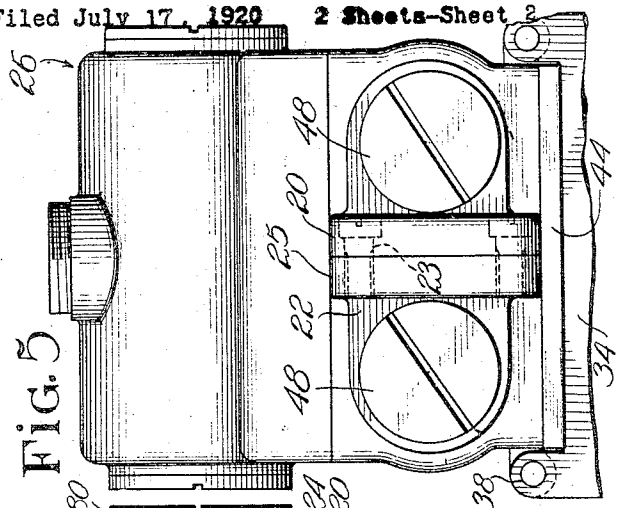


Fig. 5

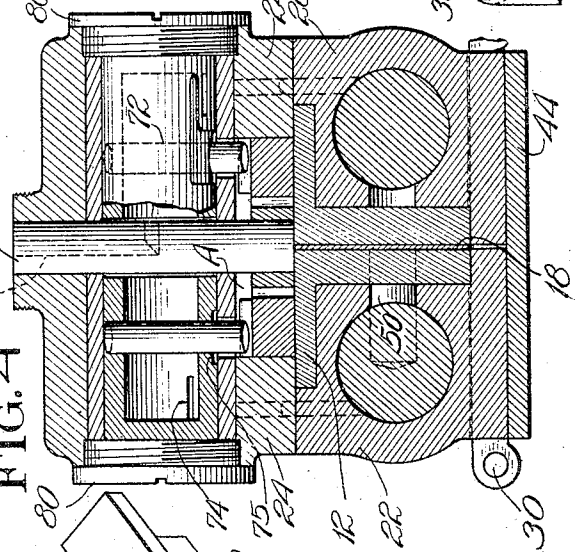


Fig. 4

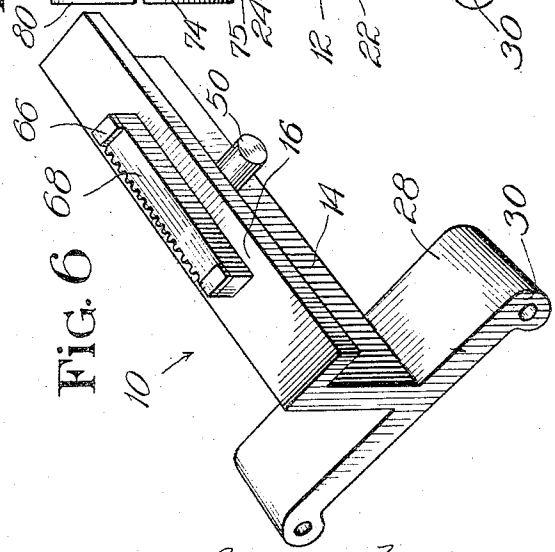


Fig. 6

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UNITED STATES PATENT OFFICE.

GUSTAF DAVID SUNDSTRAND, OF ROCKFORD, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO C. PAUL PARKER, TRUSTEE, OF CHICAGO, ILLINOIS.

RUBBING MACHINE.

Application filed July 17, 1920, Serial No. 397,008. Renewed March 2, 1923.

To all whom it may concern:

Be it known that I, GUSTAF DAVID SUNDSTRAND, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Rubbing Machines, of which the following is a specification.

My invention relates to machines for rubbing and polishing and more particularly to a fluid pressure actuated tool for such work. It is particularly advantageous when embodied in the type of tool adapted to reciprocate a pair of rubbing devices toward and away from each other in the same rectilinear path so that the forces exerted by the tool on the work in the rubbing operation are practically neutralized at all times.

One object of the invention is to provide a simple and durable mounting or support for the reciprocating elements and a simple and direct connection between these elements and the pistons or other power developing means employed to reciprocate them.

Another object is to so locate the sliding bearings for the reciprocating elements that dirt will not work into them in use, abrading the parts and causing rapid deterioration.

Another object is to direct the exhausted pressure fluid through the parts of the tool in such a way as to keep them clean and free from dirt.

Further objects and advantages of my invention will become apparent as the description proceeds.

In the accompanying drawings, Figure 1 is a side view partly in section of a tool constructed according to my invention. Fig. 2 is a section through the center of one cylinder. Fig. 3 is a plan view of the slides and pistons, the other parts being shown dotted. Fig. 4 is a section on line 4—4 of Fig. 3. Fig. 5 is an end view. Fig. 6 is a perspective view of one of the slides, and Fig. 7 is a detail view of the valve members.

In the embodiment of my invention selected for illustration, a pair of slides 10 and 12 reciprocate toward and away from each other through a trifle less than half the length of the tool. Each slide comprises a vertical portion 14 and a laterally directed horizontal portion 16 adjoining the upper edge of the vertical portion. As clearly shown in Fig. 4, the parts are guided and supported by a sliding engagement either with each other or with a thin antifriction plate 18, and by engagement of the outer sides of the vertical portions with a pair of cylinder members 20 and 22 bolted together at the ends by bolts 23 passing through ears 25 on the members. The laterally directed portions 16 overlie the cylinder members and also project under the side pieces 24 of the combined cover and valve casing 26, so that the slides are adequately supported and guided in their movement. Bolts 27 fasten the cover 26 in place on the cylinder members.

The slide 10 has a cross piece 28 at one end extending in opposite directions from the lower edge of the vertical portion 14 and terminating in apertured ends 30 projecting a trifle beyond the sides of the cylinder members. Shoes 32 and 34 may be supported by pins 36, passing through ears 38 on the shoes and through the end portions 30. The shoes may carry friction pads or other suitable rubbing or polishing element (not shown). The bottom of the body preferably projects downward at its ends at 40 and also at 42 in the center of the tool and supports a bottom cover plate or deflector 44. Two cylinders are provided, one for each reciprocating element, the cylinders preferably having open ends closed by plugs 48. A piston 46 reciprocates in each cylinder and is connected with its cooperating slide by a pin or projection 50 extending through a slot 52 in the side of the cylinder adjacent the vertical portion 14 of the slide. It will be apparent that each piston and its cooperating slide are rigidly connected to reciprocate as a unitary structure adequately guided and supported by the body.

The opposite ends of the cylinders are connected alternately to a source of live motive fluid and to exhaust passages to reciprocate the cylinders. For this purpose I have provided passageways 54 and 56 extending to opposite ends of each cylinder from a central valve casing. A sleeve 58 has ports 60 and 62 communicating with the passageways 54 and 56, and cup shaped valve members 64, one for each cylinder, are mounted within the sleeve to control the ports. The valves 64 are operated by lugs 66 on rack bars 68 carried by the slides 10 and 12, which rack bars are connected by

a pinion 70 to assure synchronous movement of the two slides.

Referring more particularly to Figs. 1 and 2 which show the position of the piston and valve just after reversal of the parts, it will be seen that the piston has moved to the left hand end of the cylinder carrying a lug 66 against the end of a pin 72 extending diametrically through the valve member 64 and downwardly through a slot 73 in the sleeve 58 to be engaged by the lug. The valve has thereby been shifted to the position shown in Fig. 1 in which a port 74 communicating with live motive fluid in the interior of the valve member is in communication with the port 60 and passageway 54 to supply live motive fluid to the left end of the cylinder while a passage 75 formed by cutting down the cylindrical surface of the valve member 64 is in communication with passageway 56 and port 62. As shown in Fig. 7, this passage is enlarged to form a chamber surrounding the pin 72 and communicating with the slot 73 in the sleeve 58. The exhaust passes through this slot and into the space A around the racks from which it escapes downwardly through the central portion of the body of the machine, passing through such portions of the vertical slot in which the slides reciprocate, as are not occupied by the slides. The arrow B in Fig. 2 indicates one path of escape for the exhaust and a similar path will be provided at the other end of the machine past the end of the other slide. This exhaust air strikes the baffle plate 44 and flows out laterally in both directions creating a decided draught when the tool is in operation which tends to blow particles of dust and dirt away from the machine. Great difficulty has been experienced in the past in preventing fine particles of dust or of the abrasive powder used on the rubbing pads, from working into the parts of the machine. This blast of exhaust fluid flowing through the working parts outwardly tends to eliminate trouble from this source.

The chamber containing live pressure fluid may receive its supply through a passage 76 in a vertical bolt 78 which by engagement with the sleeve 58 prevents rotation of the sleeve and also forms a bearing for the pinion 70. It will be seen that the parts of my device are all of relatively simple shape and that the device is rigid and compact. The cylindrical passageways defining both cylinders and the valve casing may be opened at both ends by unscrewing plugs 80 for the valve casing and the plugs 48 at the ends of the cylinders to permit convenient inspection or replacement of worn parts. The main bearing surfaces for the slides 10 and 12 are in the vertical slot in the center of the body through which slot the exhaust fluid is constantly flowing, and also along the tops of the cylinders so that the bearing surfaces are well protected from dirt.

While I have illustrated and described in detail the preferred embodiment of my invention, it should be clearly understood that the disclosure is merely for purposes of illustration and that many modifications and variations will naturally occur to those skilled in the art. It will, for instance, be obvious that it is not necessary to have separate valve members and separate pins 72 for each cylinder and that the rubbing pads need not necessarily be positioned at the ends of the device for reciprocation along the same line of movement. I aim in the subjoined claims to cover all legitimate variations and modifications falling within the spirit and scope of the invention.

I claim as my invention:

1. In a rubbing machine, a piston, a cylinder member supporting the same, a slide having surface engagement with the top of said cylinder member and a projecting portion below said cylinder member and spaced therefrom, an operative connection between said slide and said piston, and means for reciprocating said piston.

2. In a rubbing machine, a piston, a cylinder member supporting the same, a slide having surface engagement with the top of said cylinder member and a projecting portion below said cylinder member and spaced therefrom, an operative connection between said slide and said piston, and pressure fluid means for reciprocating said piston, the exhaust pressure fluid being discharged between the lower face of said cylinder member and the projecting portion of said slide.

3. In a device of the class described, a pair of pistons, cylinder members supporting said pistons for sliding movement on parallel spaced axes, independent pneumatic means associated with each cylinder member and automatically controlled by the movement of the piston for reciprocating said piston, slides driven by said pistons, racks carried by said slides and a pinion engaging both of said racks to synchronize the movement of said slides.

4. In a device of the class described, a bifurcated frame member having a central slot, a slide entering said slot and lying entirely on one side of the center line of said frame, and a cross piece below said frame extending entirely across below the same and carried by said slide.

5. In a device of the class described, a bifurcated frame member having a central slot, a slide entering said slot and lying entirely on one side of the center line of said frame, a cross piece below said frame extending entirely across below the same and carried by said slide, a second slide similar to the first slide lying on the opposite side

of the center line, and a cross piece carried by said second slide and extending entirely across below said frame, said cross pieces being mounted at opposite ends of their respective slides.

6. In a device of the class described, a bifurcated frame having a central slot opening downwardly, slides in said slot and pneumatic means for reciprocating said slides, the discharge from said pneumatic means escaping downwardly through said slot.

7. In a device of the class described, a piston, a cylinder member supporting and guiding said piston, a slot in one side wall of said cylinder member, a slide adjacent the side wall of said cylinder member, and means carried by said slide entering said slot for operative connection with said piston.

8. In a device of the class described, a piston, a cylinder member supporting and guiding said piston, a slot in one side wall of said cylinder member, a slide adjacent the side wall of said cylinder member, means carried by said slide entering said slot for operative connection with said piston, said means being approximately centrally connected to said piston and said slot being at all times covered by said piston.

9. In a device of the class described, a piston, a cylinder member supporting and guiding said piston, a slot in one side wall of said cylinder member, a slide adjacent the side wall of said cylinder member, means carried by said slide entering said slot for operative connection with said piston, said slide having a horizontal portion overlying the top of said cylinder member for guiding engagement therewith.

10. In a device of the class described, a piston, a cylinder member supporting and guiding said piston, a slot in one side wall of said cylinder member, a slide adjacent the side wall of said cylinder member, means carried by said slide entering said slot for operative connection with said piston, said slide having a horizontally projecting guide flange overlying the upper portion of said cylinder member and a horizontal cross piece carried by said guide and extending across below said cylinder member out of contact therewith.

11. In a device of the class described, a stationary sleeve defining a pressure chamber, plugs closing both ends of said sleeve, and cup-shaped valve members within said sleeve with their bottoms abutting said plugs.

12. In a device of the class described, a stationary sleeve defining a pressure chamber, plugs closing both ends of said sleeve, cup-shaped valve members within said sleeve with their bottoms abutting said plugs, and a pin diametrically secured in each cup-shaped valve member and projecting outwardly through said stationary sleeve for mechanical engagement with a valve actuating element.

13. In a device of the class described, a stationary sleeve defining a pressure chamber, plugs closing both ends of said sleeve, cup-shaped valve members within said sleeve with their bottoms abutting said plugs, a pin diametrically secured in each cup-shaped valve member and projecting outwardly through said stationary sleeve for mechanical engagement with a valve actuating element, longitudinally slidable members having projections adapted to contact said pins and shift said valves at the end of each stroke, and means constraining said slidable members to reciprocate synchronously in opposite directions.

14. In a device of the class described, a stationary sleeve defining a pressure chamber, plugs closing both ends of said sleeve, cup-shaped valve members within said sleeve with their bottoms abutting said plugs, a pin diametrically secured in each cup-shaped valve member and projecting outwardly through said stationary sleeve for mechanical engagement with a valve actuating element, longitudinally slidable members having projections adapted to contact said pins and shift said valves at the end of each stroke, means constraining said slidable members to reciprocate synchronously in opposite directions, and a piston associated with each slidable member arranged to receive power from the pressure fluid delivered by one of said valves.

15. In a device of the class described, a stationary sleeve defining a pressure chamber, a valve sleeve within said stationary sleeve, radial supply ports extending through said valve sleeve for the delivery of pressure fluid to ports in said stationary sleeve, said valve sleeve having an exhaust passage formed by a depression in the outer surface of the valve sleeve, said exhaust passage extending adjacent said supply ports, and means for shifting said valve.

16. In a device of the class described, a stationary sleeve defining a pressure chamber, a valve sleeve within said stationary sleeve, radial supply ports extending through said valve sleeve for the delivery of pressure fluid to ports in said stationary sleeve, said valve sleeve having an exhaust passage formed by a depression in the outer surface of the valve sleeve, said exhaust passage extending adjacent said supply ports, means for shifting said valve, and a single set of ports in said stationary sleeve each adapted to register alternately with one of the inlet ports and with one of the arms of the exhaust passage upon rotation of said valve.

17. In a device of the class described, a

stationary sleeve defining a pressure chamber, a valve sleeve within said stationary sleeve, radial supply ports extending through said valve sleeve for the delivery of pressure fluid to ports in said stationary sleeve, said valve sleeve having an exhaust passage formed by a depression in the outer surface of the valve sleeve, said exhaust passage extending adjacent said supply ports, means for shifting said valve, a single set of ports in said stationary sleeve each adapted to register alternately with one of the inlet ports and with one of the arms of the exhaust passage upon rotation of said valve, a cylinder structure, and passages leading from the ports in said stationary sleeve to opposite ends of the cylinder.

18. In a device of the class described, a stationary sleeve defining a pressure chamber, a valve sleeve within said stationary sleeve, radial supply ports extending through said valve sleeve for the delivery of pressure fluid to ports in said stationary sleeve, said valve sleeve having an exhaust passage formed by a depression in the outer surface of the valve sleeve, said exhaust passage extending adjacent said supply ports, a single set of ports in said stationary sleeve each adapted to register alternately with one of the inlet ports and with one of the arms of the exhaust passage upon rotation of said valve, a cylinder structure, passages leading from the ports in said stationary sleeve to opposite ends of the cylinder, a piston in said cylinder, and a slide constrained to reciprocate with said piston, said slide carrying projections adapted to contact with and shift said valve at the end of each stroke.

19. In a device of the class described, a pair of cylinder structures placed side by side and separated throughout the greater portion of their length to define a central vertical slot between them, a cover overlying said cylinder structures defining a space completely enclosed except for communication with said vertical slot, means for delivering pressure fluid to said cylinders, and means for permitting fluid to exhaust from said cylinders into said space.

20. In a device of the class described, a pair of cylinder structures placed side by side and separated throughout the greater portion of their length to define a central vertical slot, and a pair of slides reciprocating in said slot and having horizontal portions overlying said cylinder structures whereby said slides are adequately guided and supported.

21. In a device of the class described, a pair of cylinder structures placed side by side and separated throughout the greater portion of their length to define a central vertical slot, a pair of slides reciprocating in said slot, a cover structure overlying said cylinder structures and slides and defining a space completely enclosed except for communication with said slot, a valve casing in said cover structure, and a valve in said casing for delivering pressure fluid to said cylinders and exhausting fluid from said cylinders into said space.

22. In a device of the class described, a pair of cylinder structures placed side by side and separated throughout the greater portion of their length to define a central vertical slot, a pair of slides reciprocating in said slot, a cover structure overlying said cylinder structures and slides and defining a space completely enclosed except for communication with said slot, a valve casing in said cover structure, a valve in said casing for delivering pressure fluid to said cylinders and exhausting fluid from said cylinders into said space, and projections carried by said valves extending into said space for mechanical actuation by contact with said slides.

23. In a device of the class described, a pair of cylinder structures placed side by side and separated throughout the greater portion of their length to define a central vertical slot, a pair of slides reciprocating in said slot, a cover structure overlying said cylinder structure and slides and defining a space completely enclosed except for communication with said slot, a valve casing in said cover structure, a valve in said casing for delivering pressure fluid to said cylinders and exhausting fluid from said cylinders into said space, and a mechanical connection between said slides constraining them to move synchronously in opposite directions.

In testimony whereof, I have hereunto set my hand.

GUSTAF DAVID SUNDSTRAND.