

Nov. 25, 1930.

O. GEORG

1,783,115

FRICTIONAL SCREW SPINDLE PRESS

Filed July 12, 1927

2 Sheets-Sheet 1

Fig. 3.

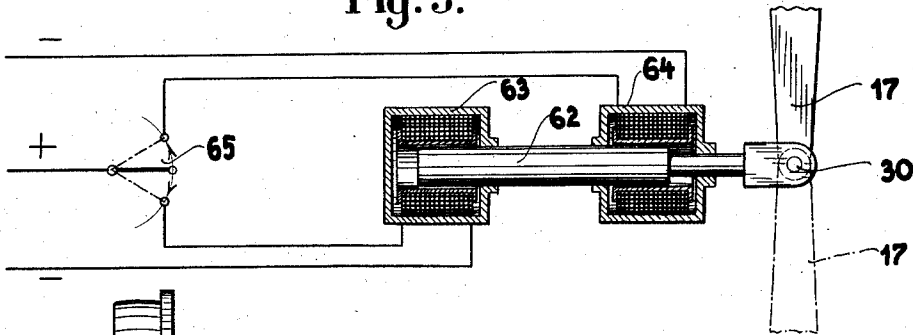
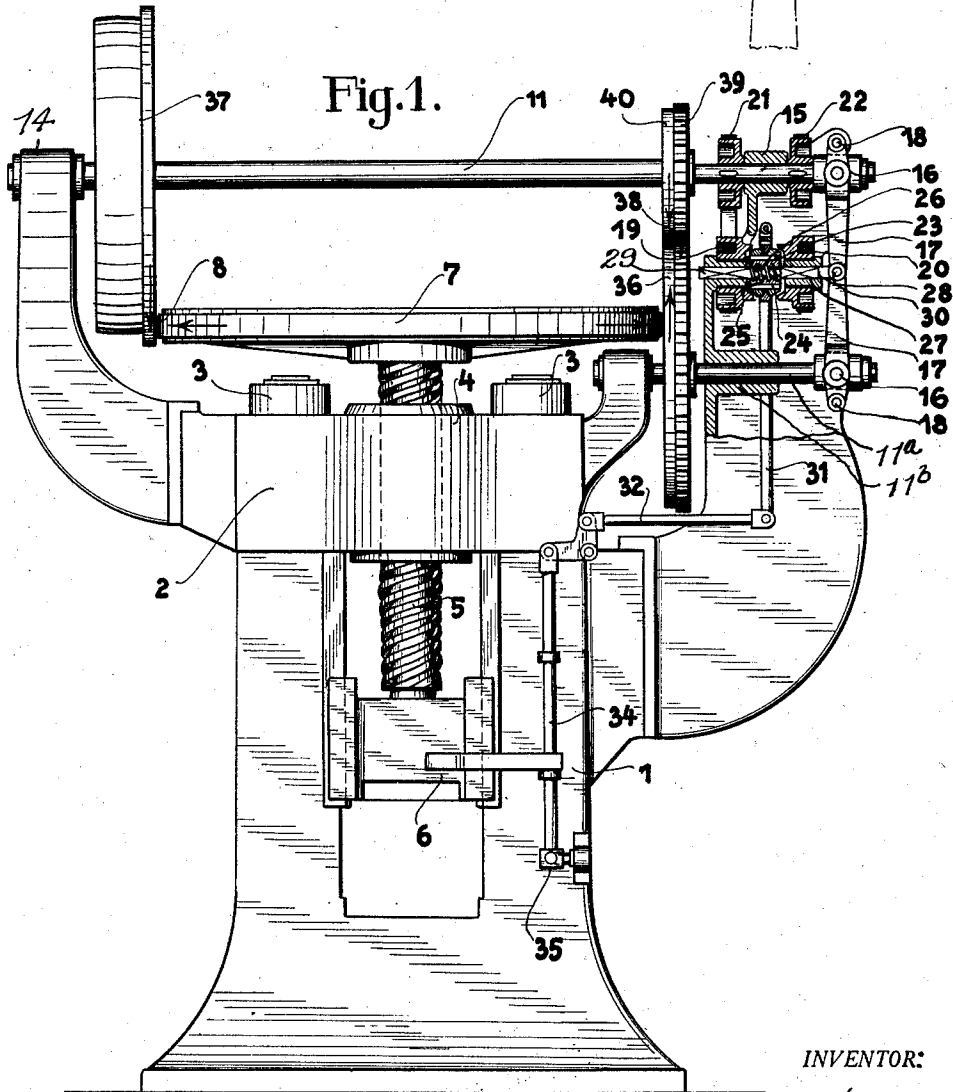


Fig. 1.



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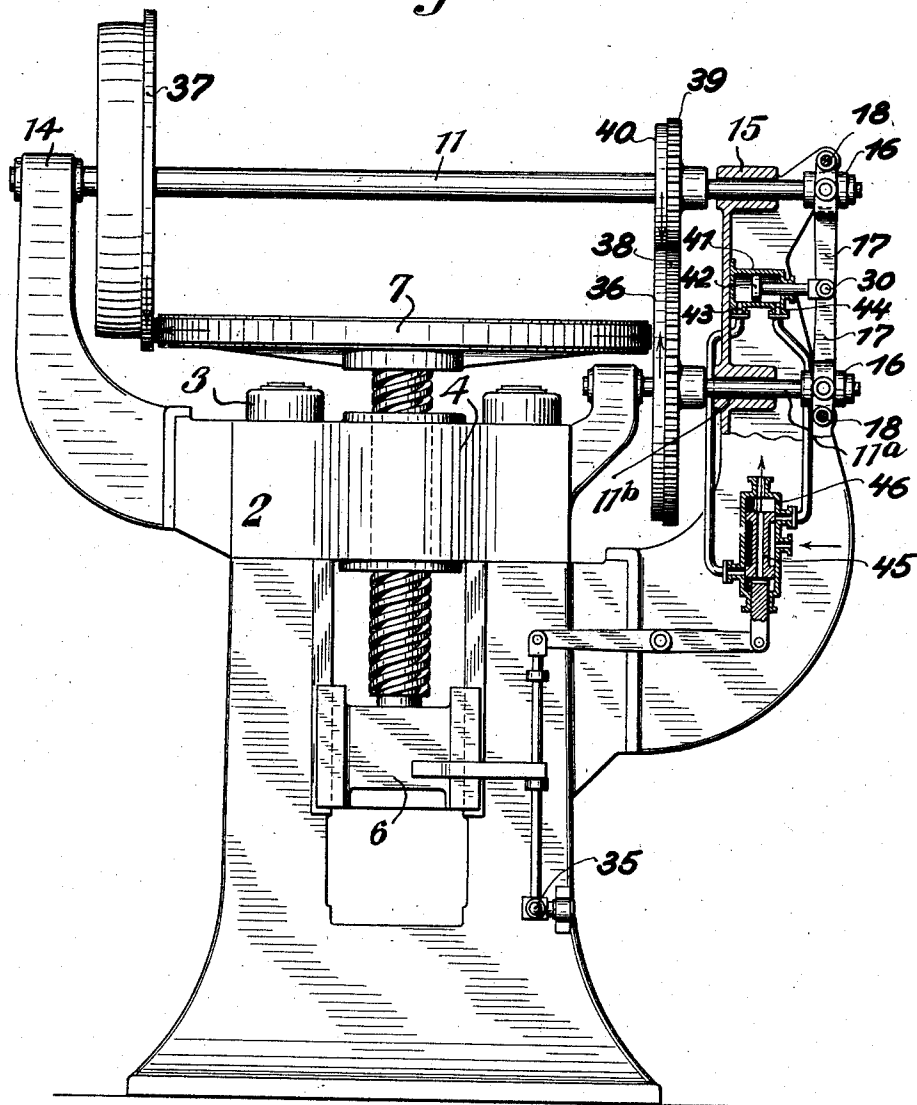
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Fig. 2.



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UNITED STATES PATENT OFFICE

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FRICTIONAL SCREW-SPINDLE PRESS

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This invention has reference to friction-operated spindle presses in which the spindle is provided with a fly wheel which, by the alternately occurring pressure of side disks, is rotated alternately towards the left and towards the right, and it refers in particular to means in connection with machines of the kind referred to and adapted to force the side disks against the intermediate fly wheel, and in connection therewith it is an important object of this invention to facilitate the operation of such machines, to increase the efficiency and to achieve great economy in working material.

In friction-operated screw spindle-presses, as heretofore constructed the side disks have been forced against the intermediate disk by manually operated means and by the operation of a corresponding system of steering and controlling levers. This manner of operation however is open to various inconveniences and difficulties. In the case of machines of medium size and large sized machines which require a considerable engaging force for the pressure of the side disks the operator is unable to furnish the required pressure. He generally does not press hard enough and as a result thereof there is a continuous relative sliding movement between the side disk and the intermediate disk with the consequent destruction of large amounts of energies in the form of relative grinding movements of the parts. With very large machines there is also the liability that the operator is unable in the lower dead-centre position to furnish the engaging pressure which is required for the raising of the heavy intermediate disk and of the spindle or shaft connected thereto and of the ram. The side disk is continuously sliding along the intermediate disk and in view of the high peripheral velocity of the side disk very large amounts of energy are annihilated and the binding tires of the intermediate disk are heated and ground and are destroyed by friction.

In order to avoid these losses and difficulties and to save the tires the operation of forcing the side disks into engagement, instead of being performed by hand as has

been the case in the previous art, is effected according to this invention by special auxiliary means, and as a result thereof the operation of the machines of the kind referred to, even of very large size is facilitated and the efficiency is very highly increased and the life of the tires is prolonged. As such auxiliary means all those agents may be employed which, in the case of other machinery, are likewise utilized for the driving of so called servo-motors, such as for instance oil, air, water, steam, springs, electromagnets or other mechanical means.

The invention will be more particularly described by reference to the accompanying drawing showing several embodiments of the principles of the invention by way of exemplification. Fig. 1 shows a screw-spindle press with an auxiliary or servo-motor in front elevation and part section. Fig. 2 represents a screw-spindle press with a servo-motor adapted to be operated by air, steam, oil or water and shown in front elevation and partial section. Fig. 3 is a diagram illustrating an electric auxiliary or servo-motor which may be employed in connection with the press shown.

The frictionally operated press according to Fig. 1 comprises the body part 1 the upper portion of which carries the bridge part 2 which is secured in position by bolts or rods 3. The transversally disposed bridge portion 2 supports a nut 4 which is engaged by the screw spindle 5. To the lower parts of the spindle the ram 6 is secured adapted to slide in the body part 1 of the machine, while at the top end of the screw spindle 5 the intermediate disk 7 is secured, the periphery of which is provided with a band or tire 8 of leather or the like. The intermediate disk 7 is operated by the two side disks 37 and 36 mounted upon the rotatable and slidable shafts 11 and 11^a, the disk being staggeringly arranged with respect to the disk 37, that is, disposed at the opposite side of the horizontal plane of the disk 7 from the disk 37, the disk 36 serving for the raising of the disk 7, while the disk 37 serves for the lowering of the disk 7. The disk 36 is actuated by a pair of gear wheels 38, 39 and by means of the small

gear wheel 40 which is mounted on the same shaft as the disk 37 and is moreover constructed to serve as a driving disk. The two shafts 11 and 11^a are rotatably and slidably mounted in their bearings 14, 15 and 11^b, and are adapted to be simultaneously slid in the same direction by means of the steering slides 16 through the medium of the superposed steering lever 17, pivotally mounted, respectively, at the stationary points 18, 18', to which levers the auxiliary or servo-motor is connected. This motor comprises two operating disks 19, 20 adapted to be turned in opposite directions. They are driven respectively by open and crossed belts from the two driving pulleys 21, 22 upon the main shaft 11. The driving disks 19, 20 are provided at their inner portions with a conical section adapted to be engaged by corresponding conical sections of the sliding collar 23. This sliding collar is adapted to slide by means of the keys or splines 24 along the nut 25 which at its inside is provided with screw threads of very steep pitch. The nut 25 is engaged with the threaded stem 26 of the steering rod 27. On both sides of the threaded portion the rod 27 is secured against rotation by corresponding square or four-cornered guides 28, 29 so that it is only free to move in the axial direction. The steering rod 27 is connected by the stud 30 to the steering levers 17 above referred to. The actuation of the servo-motor is effected by hand through the medium of the lever 31 which will couple the sliding collar 23 either with the left-hand or the right-hand driving disk. As a result thereof the nut 25 is rotated and it slidably displaces the steering rod 27 to such an extent, and until a certain engagement pressure of one or the other side disks has been obtained. Then the conical coupling begins to slide. In accordance with the right-hand or the left-hand driving disk being in the coupling position the steering rod 27 is either withdrawn or advanced, and as result thereof either the disk 36 or the disk 37 is forced into engaging position and the intermediate disk 7 is turned accordingly towards the right or towards the left, which corresponds respectively to the rising or lowering of the carriage 6. The operation of the lever 31 is effected by means of the link connection 34 and by the hand lever 35 disposed within reach of the operator. With this arrangement the operator is enabled to produce even the highest pressures.

Fig. 2 shows another exemplification of the principles of the invention. The machine as a whole is the same as the machine described with reference to Fig. 1 with the difference that the auxiliary or servo-motor in this exemplification comprises a cylinder 41 in which a piston or plunger 42 is slidably fitted. The cylinder may be charged with the driving agent, that is to say with oil, steam, wa-

ter, air or the like by means of the charging openings 43, 44 respectively disposed in front or at the rear of the piston 42. By the operation of the steering piston 45 sliding in the steering cylinder 46 the driving agent may be introduced at discretion in front or at the rear of the piston 42, so that this piston is moved either to the left or to the right with the corresponding forcing into engagement of the side disks. The intermediate disk 7 with the screw spindle is thereby moved up and down. The operation of the steering piston is effected by hand by means of the hand lever 35, as in the previous exemplification.

Fig. 3 is a diagram of an auxiliary or servo-motor adapted for operation by the electric current. An iron core 62 is adapted to be drawn towards the left or right by the two electromagnets 63 and 64. The core 62 transmits its movement by means of the stud 30 to one or both of the two levers 17. The switching on of the current for the windings of the two electromagnets 62, 64 is effected from the position of the operator by means of the switch 65. The application of this type of servo-motor will be apparent from the foregoing description.

I claim:—

1. A friction screw press comprising a frame, a ram mounted on the frame, a screw spindle mounted on the frame and connected to the ram, an intermediate horizontal friction disk carried by the spindle, parallel horizontal driving and driven shafts mounted on the frame at different levels respectively above and below the plane of the intermediate friction disk, drive gearing between the shafts, vertical friction disks respectively carried by said driving and driven shafts at opposite sides of the intermediate friction disks and alternately engageable with and disengageable from said intermediate disk by sliding motion of the driving and driven shafts in opposite directions, a pair of levers jointed at their relatively outer ends to said driving and driven shafts, a servo-motor jointed to the relatively inner ends of the levers for actuating the same in opposite directions to impart sliding motion in one direction or the other to the shafts, and means for driving said servo-motor to move the levers in one direction or the other for so sliding the shafts.

2. A friction screw press comprising a frame, a ram actuating screw spindle mounted on the frame, a horizontal friction disk carried by said spindle, a pair of vertically disposed friction disks at opposite sides of the horizontal friction disk for driving the same in opposite directions, parallel horizontally arranged rotating and sliding shafts in gear with each other and carrying the vertical friction disks and arranged respectively above and below the horizontal plane of the

horizontal friction disk, and manually controlled motor-operated means for simultaneously adjusting said horizontal shafts in one direction or the other and whereby the spindle may be governed to arrest the up and down travel of the horizontal friction disk in any working position in its range of up and down travel.

3. A friction screw press comprising a frame, a ram actuating screw spindle mounted on the frame, a horizontal friction disk carried by said spindle, a pair of vertically disposed friction disks at opposite sides of the horizontal friction disks for driving the same in opposite directions, parallel horizontally arranged rotating and sliding shafts in gear with each other and carrying the vertical friction disks and arranged respectively above and below the horizontal plane of the horizontal friction disk, and servo-motor actuated means for simultaneously sliding said horizontal shafts in one direction or the other for throwing one of the vertically disposed disks into action and the other out of action, and vice versa.

4. A friction screw press comprising a frame, a ram actuating screw spindle mounted on the frame, a horizontal friction disk carried by said spindle, a pair of vertically disposed friction disks at opposite sides of the horizontal friction disk for driving the same in opposite directions, parallel horizontally arranged rotating and sliding shafts carrying the vertical friction disks and arranged respectively above and below the horizontal plane of the horizontal friction disk, levers pivotally connected to said horizontal shafts, gearing between the shafts, a servo-motor for actuating the levers for simultaneously sliding the shafts in one direction or the other, and manually controlled means governing the servo-motor.

5. A friction screw press comprising a frame, a ram mounted on the frame, a screw spindle mounted on the frame and connected to the ram, an intermediate horizontal friction disk carried by the spindle, parallel horizontal driving and driven shafts mounted on the frame at different levels respectively above and below the plane of the intermediate friction disk, drive gearing between the shafts, vertical friction disks respectively carried by said driving and driven shafts at opposite sides of the intermediate friction disk and alternately engageable with and disengageable from said intermediate disk by sliding motion of the driving and driven shafts in opposite directions, a pair of levers jointed at their relatively outer ends to said driving and driven shafts, a servo-motor including a shaft jointed to the relatively inner ends of the levers for moving the same in opposite directions to impart sliding motion in one direction or the other to the shafts,

means for driving said servo-motor, and manually operable means for governing the action of the servo-motor.

In testimony whereof I affix my signature.

OTTO GEORG.

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