L. SCHULL.

FRICTION DRIVEN SCREW PRESS.

APPLICATION FILED DEC. 3, 1908.

995,034. Patented June 13, 1911.

2 SHEETS—SHEET 1.

Fig. 1

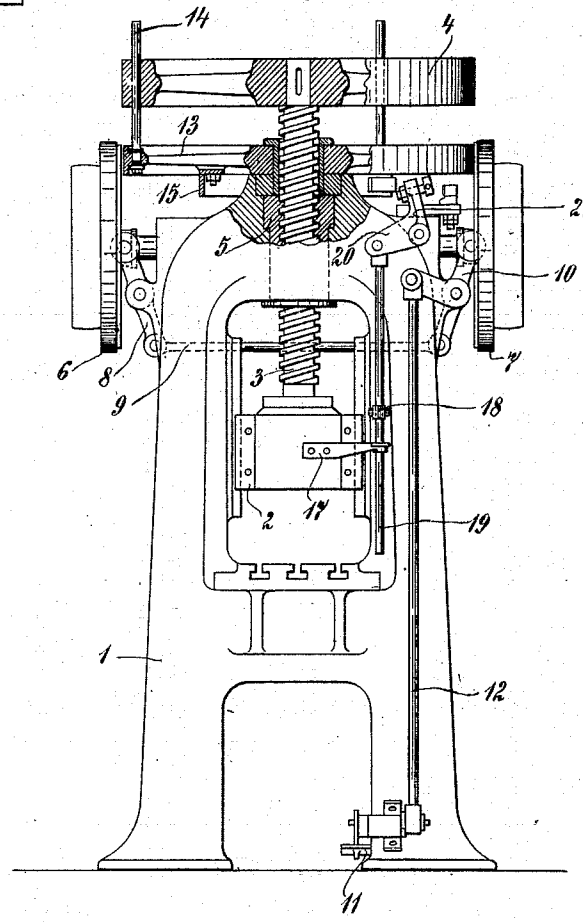
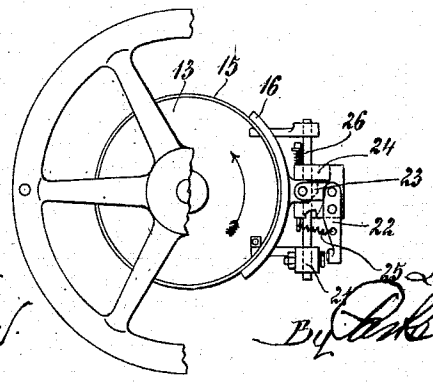


Fig. 2



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2 SHEETS—SHEET 2.

Fig. 3.

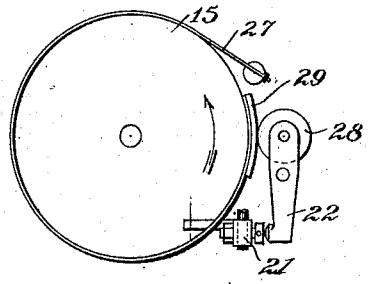
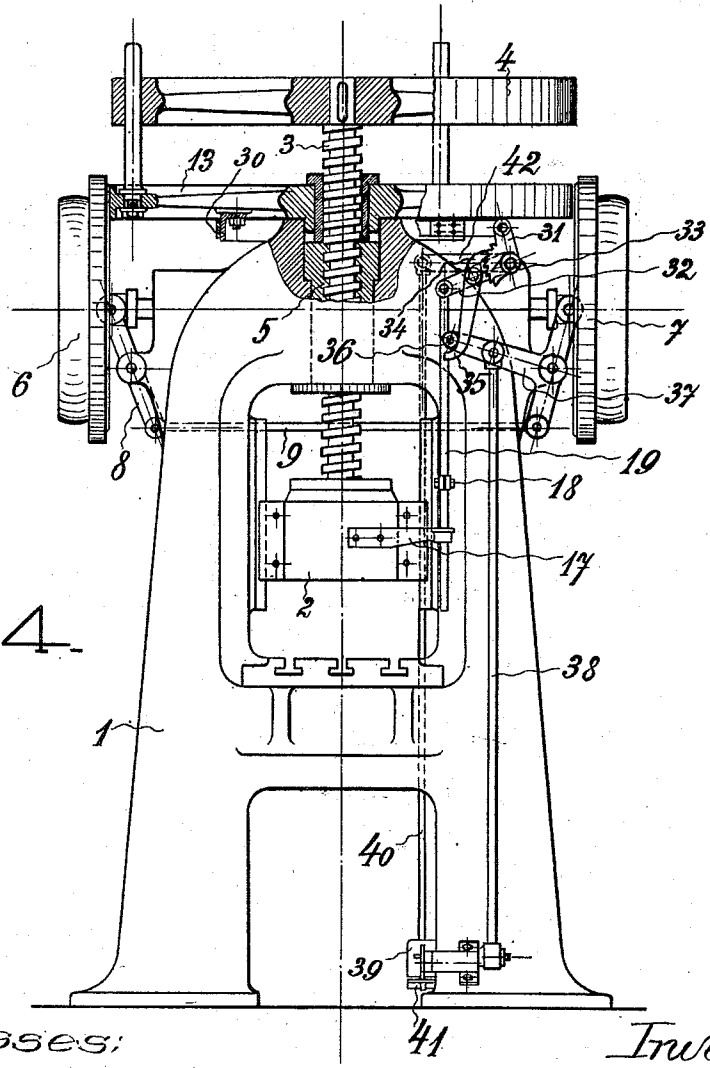


Fig. 4.



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FRICTION-DRIVEN SCREW-PRESS.

995,034. Specification of Letters Patent. Patented June 13, 1911.

Application filed December 3, 1908. Serial No. 465,891.

To all whom it may concern:

Be it known that I, LEOPOLD SCHULL, a subject of the Emperor of Austria-Hungary, residing at Vienna, in the Empire of Austria-Hungary, have invented a certain new and useful Improvement in Friction-Driven Screw-Presses, of which the following is a specification.

Screw presses operated by friction disks are well known, in which the slide carrying the tool is rotatably supported on a screw spindle which engages in a nut mounted in the standard. To the upper end of the said spindle is keyed a fly wheel, the circumference of which can be brought into contact with two friction disks arranged diametrically opposite to each other, by longitudinally moving the said disks. The two friction disks are connected together in such a manner that their longitudinal movements are always effected simultaneously when one of the two friction disks is operated by a lever and link mechanism. In addition to the said lever and link mechanism, the friction disks are also controlled by a weight, the tendency of which is to keep the disks in such position that the friction disk which brings about the ascent of the slide, is pressed against the circumference of the fly wheel, while the other friction disk intended to bring about the descent is thrown out of gear. When the lever and link mechanism is operated for moving the friction disks, either by foot or by a hand lever, the two friction disks are longitudinally moved in opposition to the action of the weight, and in such manner that the disk controlling the ascent of the slide is thrown out of engagement, and the disk operating for the descent brought into engagement with the fly wheel. After the slide has completed its working travel or stroke, the pedal or hand lever is released, and owing to the action of the weight, the two disks are again moved in the opposite longitudinal direction, so that the disk controlling the ascent comes into engagement with the fly wheel and rotates the latter in such direction that the spindle rises by reason of its nut.

In order to limit the upward stroke, one of the vertically moving parts, generally the slide, is provided with a tappet or catch which, when the slide arrives at the highest position, automatically acts on the lever and link mechanism to move the friction disks, in such a manner that in the same way as by depressing the pedal or operating the hand lever, the disk operating for the descent is thrown into gear, and the disk operating for the ascent, thrown out of gear. In that way the inertia of the fly wheel is first neutralized and the rotation of the fly wheel then reversed for a short time, so that the ascent of the slide commences. Immediately afterward the tappet or catch of the slide, however, becomes disengaged from the lever and link mechanism and the weight controlling the movement of the friction disks again operates so that by shifting the friction disks, the disk operating for the ascent is thrown into gear. In that way, the slide is again raised until the tappet or catch becomes operative and again moves the friction disks, and so on. Theoretically, at the upper end of the stroke, as long as the friction disks are being driven, there should be a permanent vertical oscillation. Owing, however, to frictional resistance, the said oscillation will gradually decrease until finally the slide will come to rest in a certain position and keep that position owing to the engagement of the disk controlling the ascent, which engagement is brought about by the weight. As will be readily understood, this method of limiting the stroke has serious disadvantages which consist first of all, in the oscillations of the slide becoming very unsatisfactory when, as frequently happens, their extent is large, so that the manipulation of the work becomes even dangerous, while secondly in the necessity for effecting the braking and upkeep of the fly wheel, and, therefore, also of the spindle and the slide, by the driving motor. These disadvantages can be obviated, according to this invention, by stopping the fly wheel when it reaches its highest position by means of a brake which renders the assistance of the friction disks superfluous and, moreover, entirely stops the oscillation. This brake can be automatically applied, on the highest position being reached, by means of a tappet or catch which, for instance, can be secured to the slide, and is constructed in such a manner that when the disk controlling the descent is thrown into gear, or in other words, the working stroke is started, the said brake is automatically released.

As the fly wheel, to which the brake has to be applied, moves up and down during its rotation, it is advisable, for simplifying the construction of the brake, to provide

the fly wheel with a brake rim which participates in the rotary motion of the fly wheel but not in its vertical reciprocation. The brake can be, for instance, constructed in such manner that at the beginning of the traveling stroke of the slide, that is to say, when the disk operating for the descent is thrown into gear, the brake releases the fly wheel automatically and immediately. This can be effected by utilizing the friction due to the rotation of the fly wheel and, therefore, of the brake rim to bring about the shifting of the brake rods, which reduces or destroys the brake pressure.

In the accompanying drawings, Figure 1 is a general view of a friction-driven screw press, parts of which are shown in section. Fig. 2 is a plan of the brake device. Fig. 3 a plan of another construction of the brake, and Fig 4, an elevation of a friction driven screw press showing a modified construction of the brake.

In the standard 1 constructed in the usual manner, is vertically guided the slide 2 controlled in the usual manner by the screw spindle 3 to which is secured the fly wheel 4. The spindle 3 engages rotatably in the nut 5 secured to the standard. At both sides of the standard, friction disks 6 and 7, each of which is connected to a belt pulley, are mounted in a horizontally adjustable manner, on pins secured to the standard. The two friction disks 6 and 7 are connected together by means of rods 8, 9 and 10 so that when one of the friction disks is moved horizontally in one or the other direction, the other disk is moved in a similar direction. This movement is effected in the well known manner by depressing a pedal 11, which, by means of a rod 12, acts on a bell crank lever engaging with one of the two friction disks. At the upper portion of the standard 1 is mounted, concentrically with the spindle, a friction wheel 13 provided with bolts or pins 14 projecting upward through openings in the fly wheel 4 into which they fit. When the pedal 11 is depressed, that one of the two friction disks which is to bring about the descent of the slide, is pressed against the friction wheel. When the friction wheel 13 rotates, the bolts 14 (several such bolts can be used, though sometimes one alone is sufficient), drive the fly wheel and cause the spindle to rotate in a direction to lower the slide. During this descent, the fly wheel slides downwardly, on the bolts or pins 14, while the friction wheel 13 does not change its level. When the pedal 11 is released, the two friction disks 6 and 7 are moved by a spring or weight, so that that one of the two disks which brings about the ascent, is thrown into gear, while the other one is disengaged from the friction wheel 13. To the latter is secured a brake rim 15 (see also Fig. 2). The brake jaw or block 16 automatically comes into contact with the said brake rim 15 when on the slide 2 reaching the highest position, its tappet or catch 17 engages a projection 18 of the rod 19 which acts on the bell crank lever 20, 21. When the rod 19 is raised, the arm 21 of the said bell crank lever strikes the free end of the lever 22 (Fig. 2), the other end of said lever being connected by means of a rod 23 to the brake jaw 16, so that the brake jaw is pressed against the brake rim 15.

In order to prevent the brake jaw 16 from participating in the rotation of the brake rim 15 in the direction of the arrow shown in Fig. 2 during the ascent, an abutment 24 is provided for the rod 23, so that the braking force can act to the full extent. The friction wheel 13 is thus stopped and maintains the fly wheel 4 at rest in its raised position by means of the pins 14. When, however, the friction wheel 13 is rotated in the opposite direction by throwing into gear the friction disk operating for the descent, the friction jaw 16 is carried by friction to a small extent, whereby the rod 23 is moved downward slightly and consequently the brake jaw 16 is moved away from the brake rim 15. Thus the brake becomes automatically disengaged, so that the descent of the fly wheel and of the slide can begin at once. A spring 25 secured on the one hand to the standard, and on the other hand to the lever 22, moves the lever 22, as soon as the tappet or catch 17 has released the projection 18, into such position that the rod 23 removes the brake jaw 16 from the brake rim 15, a spring 26 bringing the rod 23 and, therefore, also the brake jaw 16, back into the original position, from which they had been moved, as already stated, by the initial movement of the friction rim 15 at the descent of the slide, owing to friction. As the stopping and upkeep of the fly wheel is now done by the brake, it is no longer necessary, that the friction disks should become operative when the fly wheel reaches the highest position. The two friction disks, can therefore, be out of engagement with the friction wheel at the end of the stroke. The load which causes the engagement of the friction disk with the friction wheel for insuring the ascent, can, therefore, be automatically neutralized as will be described later in another construction by the engagement of the tappet or catch 17 with the projection 18, so that at this end of the travel, neither of the friction disks will be in engagement with the friction wheel. On the contrary, the friction disks 6 and 7 will rotate quite loosely.

Fig. 3 shows another construction of the brake device which differs from the preceding one in that a brake band 27 is used instead of a brake jaw for acting on the brake rim 15. The bell crank lever 20, 21 controls

as before a lever 22 which, however, in this case is provided at the other end with a roller 28 adapted to engage the free end of the brake band 27 which is provided with a block 29. Owing to the rotation of the brake rim during the ascent, taking place in the direction of the arrow, the pressure of the roller 28 against the fitting of the brake band causes the latter to participate in the movement owing to the friction, and expands it, so that the brake is applied. When the friction disk controlling the descent is thrown into gear, the direction of rotation is reversed, the brake band 27 being at the beginning caused to participate a little in the movement and is thus released, so that in this construction also the brake is automatically released.

Another construction of the brake is shown in elevation in Fig. 4, in which the free end of a brake band 30 is also applied by a lever 31 when during the ascent of the slide 2 the tappet or catch 17 strikes the projection 18 of the rod 19 and thus turns a lever 32 about a spindle 33 on which is loosely mounted the lever 31, which however is moved outward by means of a pawl 34 engaging with teeth upon the lever 31. The said pawl 34 is mounted on the lever 32 and provided with an extension 35 engaging with a pin 36 of a bell crank 37 which can be controlled from the pedal 41 by means of a connecting rod 38. When the pedal 41 is depressed, the pin 36 is also moved downwardly by means of the rod 38 and the lever 37, and disengages the pawl 34 from the teeth of the lever 31, so that the brake band 30 is loosened. As, however, the depression of the pedal 41, results in throwing the friction disk 7 controlling the descent into gear, it will be seen, that the brake is thus released at the same time, so that the descent can take place at once. Upon the spindle 33 is also mounted a lever 42 to which is pivoted a rod 40 controlled by a weight 39, connected to the pedal 41, which weight 39 by means of the pedal, rod 38, bell crank 37, rod 9 and lever 8 acts on the two friction disks so that the friction disk 6 operating for the ascent is automatically pressed against the friction wheel 13, while the other disk 7 operating for the descent is shifted away from the friction wheel 13. On the highest position of the fly wheel being reached, as soon as the brake is applied, the said friction disk 6 must also be thrown out of gear, this being effected by the automatic raising of the weight 39 by reason of the engagement of the tappet or catch 17 with the projection 18, whereby bar 19 and lever 32 are raised which latter is connected to lever 42 by means of the spindle 33, this lever 42 being in connection with the weight 39 by means of the rod 40. The raising of the weight 39 by means of the tappet or catch 17 is not so high that it is affected by pressing down the pedal 41, because the mentioned raising of the weight should not yet bring the disk 7 in contact with the friction wheel 13. At this moment both disks 6 and 7 should be out of contact with wheel 13. This releasing means for the two friction disks could of course be used in the other construction also.

It is obvious that the construction of the friction drive and also of the brake can be modified in various ways without departing from the spirit of this invention.

Having now particularly described and ascertained the nature of my invention and in what manner the same is to be performed, I declare, that what I claim is:—

1. A friction screw press comprising a frame, a spindle in threaded engagement with said frame, a wheel rigidly mounted upon said spindle, a disk rotatably mounted upon the spindle, sliding connections between said disk and said wheel, friction wheels in engagement with said disk and driving means for said friction wheels, a brake rim mounted upon said disk and a brake in engagement with said rim and means responsive to the longitudinal motion of said spindle for operating said brake.

2. A friction screw press comprising a frame, a spindle in threaded engagement with said frame, a wheel rigidly mounted upon said spindle, a disk rotatably mounted upon the spindle, sliding connections between said disk and said wheel, friction wheels in engagement with said disk, driving means for said friction wheels, a brake rim mounted upon said disk, a brake in engagement with said rim, means responsive to the longitudinal motion of said spindle for operating said brake, and means for laterally moving said wheels to reverse the direction of travel of the spindle, said means adapted also to release the brake.

3. A friction screw press comprising a frame, a spindle in threaded engagement with said frame, a wheel rigidly mounted upon said spindle, a disk rotatably mounted upon the spindle, sliding connections between said disk and said wheel, friction wheels in engagement with said disk, means for maintaining one of said friction wheels in contact with the disk during the working stroke, automatic means for bringing the other wheel in contact with the disk, driving means for said friction wheels, a brake rim mounted upon said disk and a brake in engagement with said rim and an arm carried by said spindle adapted to bring said brake into operative engagement with the rim at the end of the reverse stroke.

4. The combination with a frame of a screw-threaded spindle in engagement therewith, a wheel rigidly mounted upon said spindle, a disk rotatably mounted about said

spindle having sliding connections with said wheel and two friction wheels adapted to be successively in engagement with said disk, a brake rim in connection with said disk, a brake, and means responsive to the motion of the spindle for operating said brake.

5. The combination with a frame of a screw-threaded spindle in engagement therewith, a wheel rigidly mounted upon said spindle, a disk rotatably mounted about said spindle having sliding connections with said wheel, two friction wheels adapted to be successively in engagement with said disk, a brake rim in connection with said disk, a brake, means for bringing first one and then the other of said friction wheels in contact with the disk, automatic means for operating said brake, and means for disengaging said brake.

In testimony whereof I have hereunto set my hand this 13th day of November 1908.

LEOPOLD SCHULL.

Witnesses:
JOHANN LUX,
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