

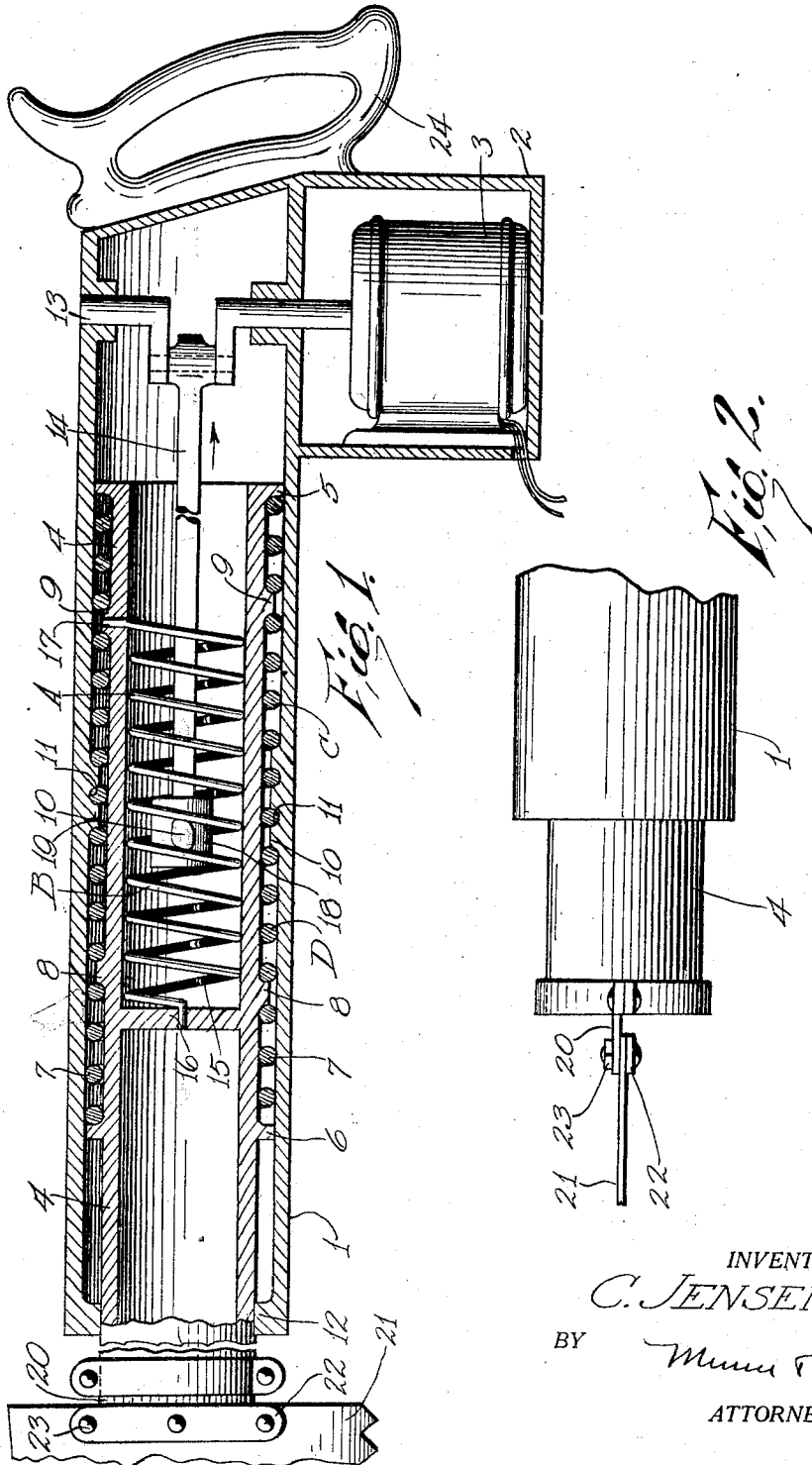
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C. JENSEN

MEANS FOR OPERATING HANDSAWS

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*Fig. 2.*

*Fig. 1.*

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# UNITED STATES PATENT OFFICE.

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MEANS FOR OPERATING HANDSAWS.

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To all whom it may concern:

Be it known that I, CARL JENSEN, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Means for Operating Handsaws, of which the following is a full, clear, and exact description.

It is a well known fact that each time the direction of motion of a given body is reversed, the resistance opposed by its inertia has, of course, to be overcome anew, thus making the loss of energy the greater as the change of direction is more frequent. It has been found that by using springs so connected to the moving body as to be compressed and expanded by this body the body will yield a considerable surplus of power with the same expenditure of energy when the body is reciprocated so as to oscillate the same number of times as the period of oscillation of the springs.

The principal object of my invention is to provide a means for operating hand saws in which the reciprocating member is connected to the saw by means of springs and in which this reciprocating member is tuned to the normal vibration period of the spring so as to cause the member to exert the same force upon the saw at all times and also provide a member which yields a considerable surplus of power with the same expenditure of energy, due to this special construction.

A further object of my invention is to provide a means for operating hand saws which is portable and in which saws of various kinds may be quickly attached to the device for use.

Other objects and advantages will appear in the following specification, and the novel features of the invention will be particularly pointed out in the appended claim.

My invention is illustrated in the accompanying drawings forming a part of this application, in which:

Figure 1 is a vertical section of the device, portions being shown in elevation, and

Figure 2 is a top plan view of a portion of the device.

In carrying out my invention I provide a casing 1 which in the present form of the device is cylindrical, and which is provided with a compartment 2 in which a motor 3 is housed. In the present form of the device I have shown the motor 3 as being of the

electrical type, although various kinds of motor power may be used without departing from the spirit and scope of the invention. A plunger 4 is slidably mounted in the cylinder 1 and is spaced from the inner wall of the cylinder by means of flanges 5 and 6. The space formed by the walls of the cylinder 1 and the plunger 4 receives a coiled spring 7, the ends of the spring being adapted to bear against the flanges 5 and 6. The plunger 4 is also provided with two annularly disposed ribs 8 and 9 against which portions of the coil spring 7 bear. The cylinder 1 is provided with an inwardly extending rib 10 that has grooves 11 therein to receive the spring 7. The free end of the cylinder 1 has an inwardly extending flange 12 which slidably engages with the outer surface of the plunger 4.

From the construction thus far described it will be apparent that the plunger 4 is adapted to reciprocate in the cylinder 1, and that the spring 7 tends to return the plunger to normal position and to prevent the initial movement of the plunger in either direction from normal position. The special purpose of the spring 7 will be hereinafter more clearly described.

The means for reciprocating the plunger 4 comprises a motor 3 as heretofore stated, a crank 13, and a connecting rod 14. The connecting rod 14 is connected to a coil spring 15 at the midpoint of the latter. One end of the coil spring is secured to a partition 16 that extends across the cylinder 4 when the end of the coil spring 15 is inserted in an opening 17 in the side of the plunger 4. A block 18 is carried by the free end of the connecting rod 14, and is provided with trunnions 19 that bear against the coils of the spring 15. It is obvious that the connecting rod 14 may be connected to the spring 15 in any other well known manner. The principal purpose is to connect the connecting rod 14 to the center of the spring 15 whereby it will be necessary to slightly compress either half of the coil spring 15 and to expand the other half before the connecting rod will move the plunger 4.

It will be noted from Figure 2 that I provide a plate 20 which is secured to the plunger 4 at its free end, this plate being adapted to carry saws 21. The saws 21 have strips 22 secured thereto, this strip being provided with openings through which bolts 23 may

extend. The bolts 23 are inserted through openings in the plate 20 and thus lock the saw 21 to the plate 20. Any special type of saw 21 may be used and may be substituted for the saw being used by merely removing the bolts 23 and then connecting the new saw to the plate 20 by means of these bolts.

From the foregoing description of the various parts of the device the operation thereof may be readily understood. As stated in the first part of the specification, it is necessary that the natural period of vibration of the springs 7 and 15 be tuned with the number of revolutions the crank 13 makes, so as to cause the connecting rod 14 to oscillate the same number of times as the natural oscillation period of the springs 7 and 15. Assume that the connecting rod 14 is first moved in the direction as indicated by the arrow in Figure 1. The trunnions 19 will compress that portion of the spring, hereinafter indicated by the letter A, which extends between the trunnions and the opening 17, and will expand the other portion B of the spring 15. Obviously the portion A will be compressed more and more as it moves the plunger 4 in the direction of the arrow. As soon as the plunger 4 starts to move it will expand the portion C of the spring 7 that extends between the ribs 8 and 10. It will therefore be seen that when the connecting rod 14 is moved in the direction of the arrow it not only moves the plunger 4 in this direction, but also stores up energy in the portion A of the spring 15 and the portion D of the spring 7. The portions A and D tend to return to normal position and if permitted to do this in their normal period of vibration they will give up their energy to the plunger 4 at the instant this energy is most needed, i. e., when the plunger is at the end of its stroke after movement in the direction of the arrow. If, now, the movement of the connecting rod is reversed it will not have to overcome the entire resistance of inertia, due to the fact that the portions A and D are giving up their energy and moving the plunger 4 in the same direction as the connecting rod 14 is now moving the plunger. During the movement of the connecting rod 14 in a reverse direction to the arrow, the portions A and D will resume their normal position and then will be expanded as the crank pin continues to move. When the portions A and D are expanding, the plunger 4 and the trunnions 19 are com-

pressing the portions B and C, thus storing up energy in these portions of the spring, which energy will be expended when starting the plunger on its reverse movement.

It will clearly be seen from the foregoing operation, that if the connecting rod 14 is oscillated the same number of times as the normal oscillation of the springs 7 and 15 these springs will greatly aid in overcoming the resistance of inertia, thus causing the motor 3 to exert a uniform force upon the saw 21, no matter in what position the connecting rod 14 may be. It is obvious that since this resistance of inertia is overcome by the springs 7 and 15 a much larger per cent of power developed by the motor 3 will be transmitted to the saw 21 and will not be consumed in starting and stopping the plunger 4 as has heretofore been the case.

The cylinder 1 is provided with a handle 24 which may be grasped by the workman in the customary manner so as to hold the saw in the desired position. A push button switch, (not shown) may be disposed adjacent to the handle 24, if desired, so as to permit the operator to actuate the saw as often as he desires. The device is extremely compact in construction, and is therefore readily portable, thus permitting the device to be used as conveniently as an ordinary hand saw. It is obvious that the special construction of the moving parts will cut down the troublesome vibration which is usually the case in tools which employ a reciprocating member for driving. The operator can therefore use the device a long time without feeling the strain that comes from grasping a constantly vibrating handle.

I claim:

A device of the type described comprising a cylinder, a plunger mounted in said cylinder, a spring for returning said plunger to normal position after said plunger has been moved in either direction, a motor carried by said cylinder, a crank shaft operatively connected to said motor, a connecting rod operatively connected to said crank shaft, and a spring connecting said rod to said plunger, said rod being connected to said spring midway between the ends of said spring, said springs having a natural period of vibration equal to the normal number of reciprocations of said reciprocating rod.

CARL JENSEN.