F. J. BACKSCHEIDER.

POWER DRIVEN TOOL.

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Fig. 1

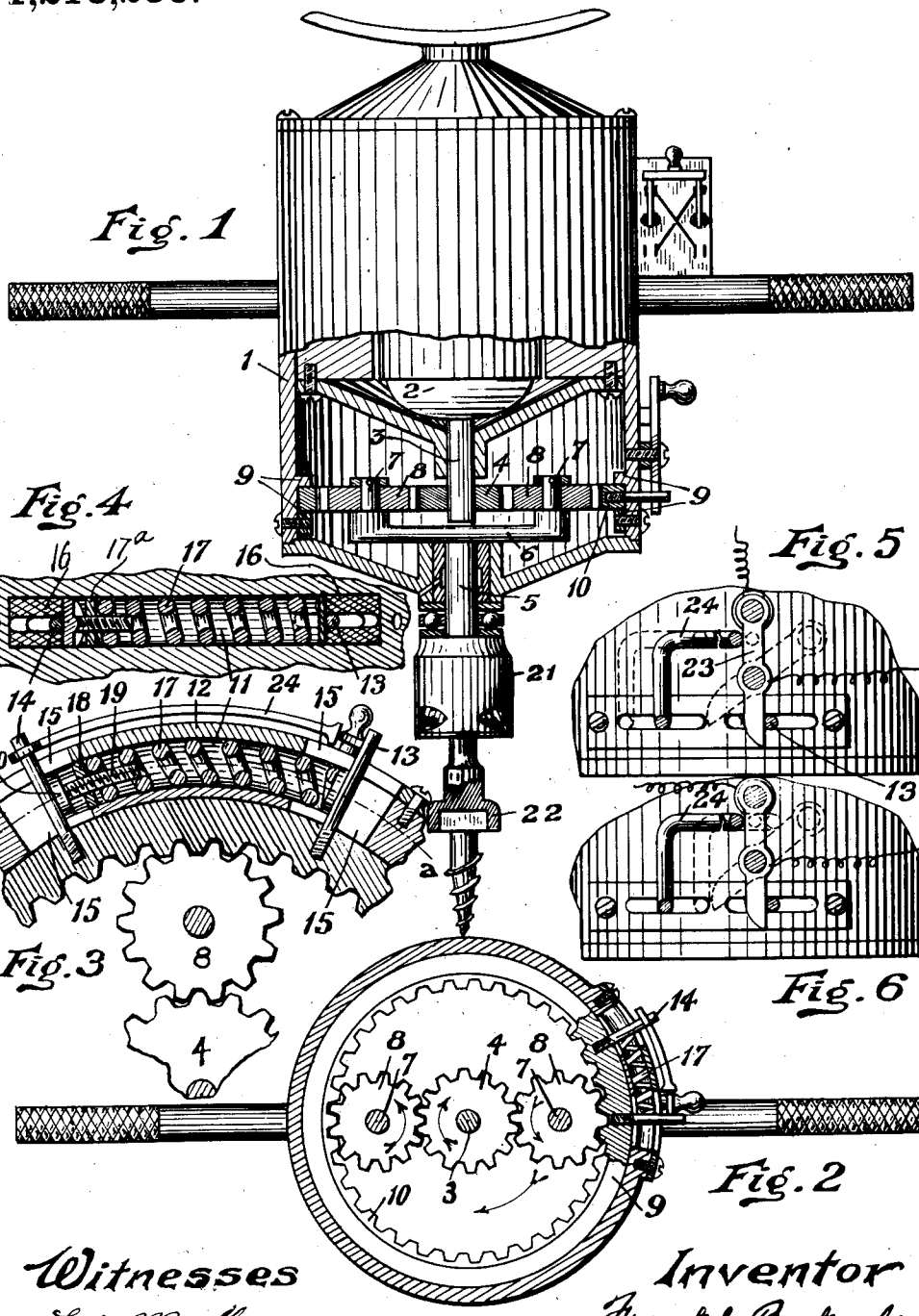


Fig. 4

Fig. 3

Fig. 5

Fig. 6

Fig. 2

Witnesses

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POWER-DRIVEN TOOL.

1,218,236. Specification of Letters Patent. Patented Mar. 6, 1917.

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To all whom it may concern:

Be it known that I, FRANK J. BACKSCHEIDER, a citizen of the United States, residing in Cincinnati, in the county of Hamilton and State of Ohio, have invented a certain new and useful Improvement in Power-Driven Tools, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to power driven tools generally, but especially to portable electric tools; and has for its object the provision of such a device, in which, when the tool is subjected to an overload, such overload will be prevented from falling on the motor, thus forestalling possible injury thereto. Especially in electrically driven tools is it advantageous and necessary to provide some means to prevent the overload from falling on the armature and burning out the same. This has heretofore been done in a number of ways, chiefly by the use of fuses, which burn out with the overload, and thus cut off the motor from injury; the same object has also been attained by the several devices covered by Letters Patent of the United States Numbers 908,726 and 964,197 issued to me on January 5, 1909 and July 12, 1910 respectively; and also by the new form of clutch covered by my application Serial Number 718,100, filed August 31, 1912, of which several devices the construction hereinafter disclosed is a modification.

In the drawings and description hereinafter contained, I have disclosed my new invention as applied to a device for driving lag screws, but it will be understood that the same is of general applicability, and, therefore, I do not limit myself to such application. In screw driving tools, however, the same will be of peculiar advantage, inasmuch as the tool will be automatically stopped when the operation on each screw is completed, the driven screw throwing an overload on the tool and disconnecting the current in the manner hereinafter fully set forth. Large numbers of screws may thus be driven at great speed and with great uniformity, with a minimum of delay for the operation of the tool.

In the drawings:

Figure 1 is a longitudinal section of an electrically driven screw driving machine embodying my new invention;

Fig. 2 is a transverse section of the same;

Fig. 3 is an enlarged section showing tension mechanism;

Fig. 4 is a section of the tension mechanism on line *a*—*a* of Fig. 3;

Fig. 5 is detail showing the method of throwing the switch arm;

Fig. 6 is another detail showing method of throwing switch on the reverse.

The numeral 1 indicates the casing of a portable screw driving machine, which casing contains the armature 2, the latter mounted and operating therein in the usual manner. On the armature shaft 3 is keyed a spur gear 4. Fixedly secured to the upper end of a spindle 5 is a yoke 6, said yoke carrying pintles 7 on which planet gears 8 are rotatably mounted. The gears 8 intermesh with the gear 4. On the inner face of the casing are two annular ribs 9, forming a groove in which the internal gear 10 is mounted, thereby securing said internal gear against lateral movement in the casing but permitting the same to rotate by sliding between the ribs 9. The planet gears 8, besides intermeshing with the gear 4, intermesh with the internal gear. At any desired point over the periphery of the internal gear a channel or groove 11 is formed in the casing, as shown in Figs. 2, 3 and 4, and a plate 12 is screwed onto said casing over said groove. On the periphery of the internal gear are arms 13 and 14, which pass through slots 15 in the casing and plate, said slots being long enough to permit the arms to move in either direction therein. Near each end of the channel or groove 11 is a fixed web 16, as clearly shown in Fig. 4, each of said webs having an opening through the middle to permit the passage therethrough of one of the arms 13 and 14. Mounted in the groove 11 is a coiled tension spring 17; one end of said spring abuts against a washer 17^a, and the other against a nut 18 screwed onto a threaded pin 19 carried by a washer 20, the washers 17^a and 20 and nut 18 being of substantially the same diameter as the spring, that is, of a size approximately to fill the groove 11. By means of the nut 18, as will be readily apparent, the tension of spring 17 may be adjusted, the washer 20 abutting against a web 16. The arms 13 and 14 are so spaced on the periphery of the internal gear as normally to lie in the middle openings in the webs 16, and thus, as will be seen in Fig. 3 the washer 17^a, besides abutting against a web 16, also

abuts against the arm 13; and similarly the washer 20 abuts against arm 14 besides web 16. The tension of the spring 17 is such that, during the normal operation of the tool, the internal gear is prevented from rotating in the groove between ribs 9. The planet gears 8 will, therefore, normally travel around the internal gear carrying with them the yoke 6 and rotating the spindle 5, said spindle carrying chuck 21 and tool 22, which, in the drawings, is shown as adapted to receive the head of a lag screw. The arms 13 and 14 project beyond the wall of the casing, and arm 13 is adapted to bear against one end of the switch arm 23, when said switch arm is in its "on" position, as shown in Fig. 5. The arm 14 carries a bent arm 24, the end of which is adapted to bear against the end of switch arm 23 opposite to the end against which arm 13 bears, when the switch arm is in its "on" position, and also on the opposite side of the switch arm, so that the arms 13 and 24 are adapted to throw the switch arm to the "off" position, shown by broken lines in Figs. 5 and 6, when the internal gear is revolved in either direction.

The operation of my new tool is as follows: Assume the several gears to be in movement in the directions shown by the arrows on said gears; in such case, so long as the internal gear is prevented from rotating, the planet gears 8 will travel around the same in the direction of the large arrow in Fig. 2, thus driving the tool as above set forth. When, however, the tool is subjected to an overload, as when the screw is fully driven, the same is communicated to the yoke 6, thus fixing the axes of the planet gears 8 and preventing said gears from traveling, as normally, around the internal gear. In such event, the gears 8 continuing to be actuated by the gear 4, will cause the internal gear to rotate against the tension of spring 17. The internal gear, carrying with it the arm 13, which bears against the switch arm, will, by its movement, throw the switch arm to its "off" position, the change in the position of the switch arm and of the arms 13 and 24 being shown in broken lines in Fig. 5, and the motor will thus be stopped. The entire operation, from the overload to the stopping of the motor, being practically instantaneous, the motor will be relieved of the overload and attendant injury. When operated on the reverse, the internal gear will be rotated in the opposite direction following the stalling of the tool, and the arm 24 will then throw the switch arm to its "off" position, the changes in the positions of the several parts by such movement being shown in broken lines in Fig. 6, and the current will thus be cut off from the motor saving it from injury.

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

1. In a device of the character specified, the combination with a power shaft and a driven shaft, of a gear mounted on said power shaft, a planet gear mounted on said driven shaft and adapted to intermesh with the gear on said power shaft, an internal gear rotatably mounted and adapted to intermesh with said planet gear, means whereby said internal gear is normally secured against rotation, and means for controlling the power supplied to said power shaft actuated by the rotation of said internal gear.

2. In a device of the character specified, the combination with a power shaft and a driven shaft, of a gear mounted on said power shaft, a planet gear mounted on said driven shaft and adapted to intermesh with the gear on said power shaft, an internal gear rotatably mounted and adapted to intermesh with said planet gear, a spring mounted stationary with reference to said internal gear, means whereby said spring is adapted normally to secure said internal gear against rotation, and means for controlling the power actuated by the rotation of said internal gear.

3. In a device of the character specified, the combination with a casing, a power shaft and a driven shaft, of a gear mounted on said power shaft, a planet gear mounted on said driven shaft and adapted to intermesh with the gear on said power shaft, an internal gear rotatably mounted and adapted to intermesh with said planet gear, a spring interposed between said casing and said internal gear, normally to secure said internal gear against rotation, means to adjust the tension of said spring, and means for controlling the power actuated by the rotation of said internal gear.

4. In a device of the character specified, the combination with a casing, a power shaft and a driven shaft, of a gear mounted on said power shaft, a planet gear mounted on said driven shaft and adapted to intermesh with the gear on said power shaft, an internal gear rotatably mounted and adapted to intermesh with said planet gear, a spring interposed between said casing and said internal gear normally to secure said internal gear against rotation, arms mounted on said internal gear, and means for controlling the power actuated by said arms upon the rotation of said internal gear.

5. In a device of the character specified, the combination with a casing, a power shaft and a driven shaft, of a gear mounted on said power shaft, a planet gear mounted on said driven shaft and adapted to intermesh with the gear on said power shaft,

an internal gear rotatably mounted and adapted to intermesh with said planet gear, a spring interposed between said casing and said internal gear, normally to secure said internal gear against rotation, arms mounted on said internal gear, means to adjust the tension of said spring, and means for controlling the power actuated by said arms upon the rotation of said internal gear.

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