

F. J. BACKSCHEIDER.
POWER DRIVEN TOOL.
APPLICATION FILED APR. 7, 1913.

Patented Feb. 13, 1917.

2 SHEETS—SHEET 1.

1,216,047.

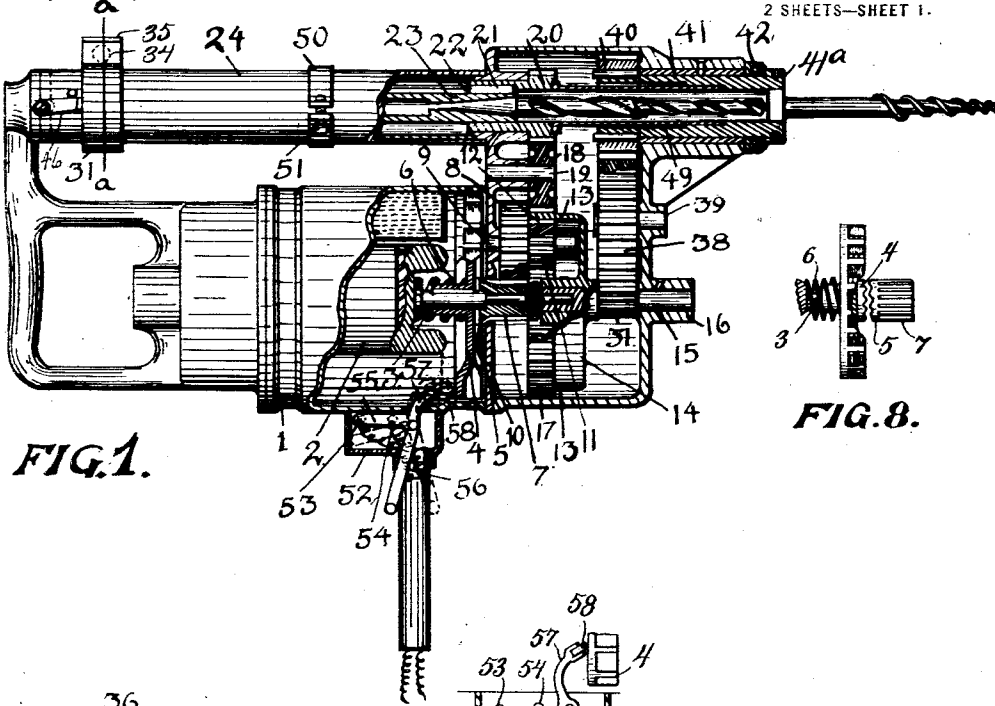


FIG. 1.

FIG. 8.

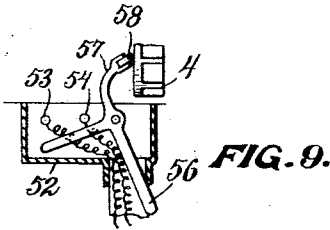


FIG. 9.

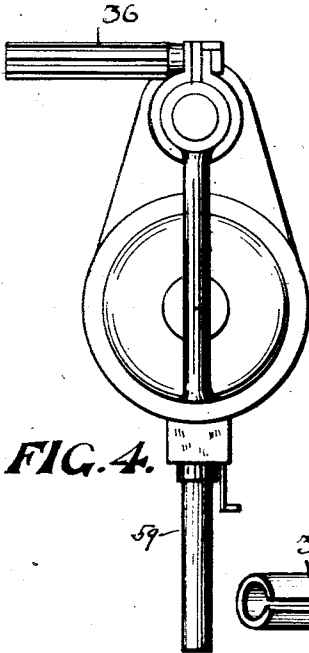


FIG. 4.

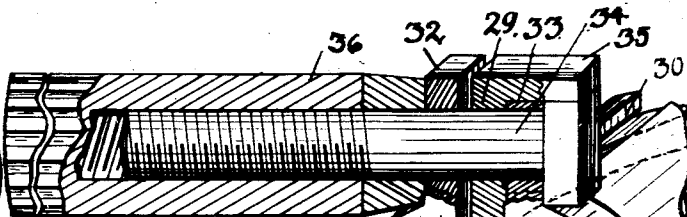


FIG. 5.

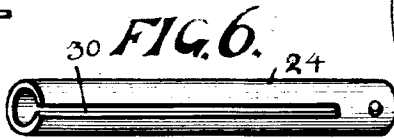
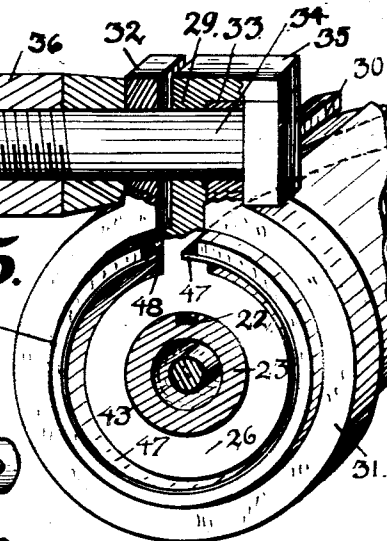


FIG. 6.



FIG. 7.



WITNESSES

Louis Mueller
Fred W. Wendeln

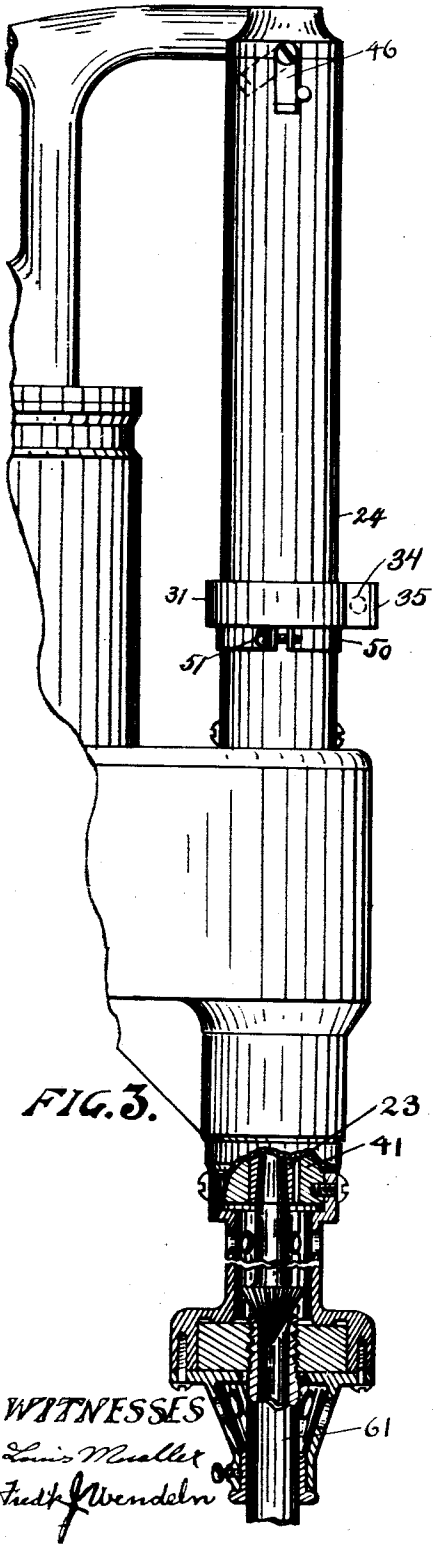
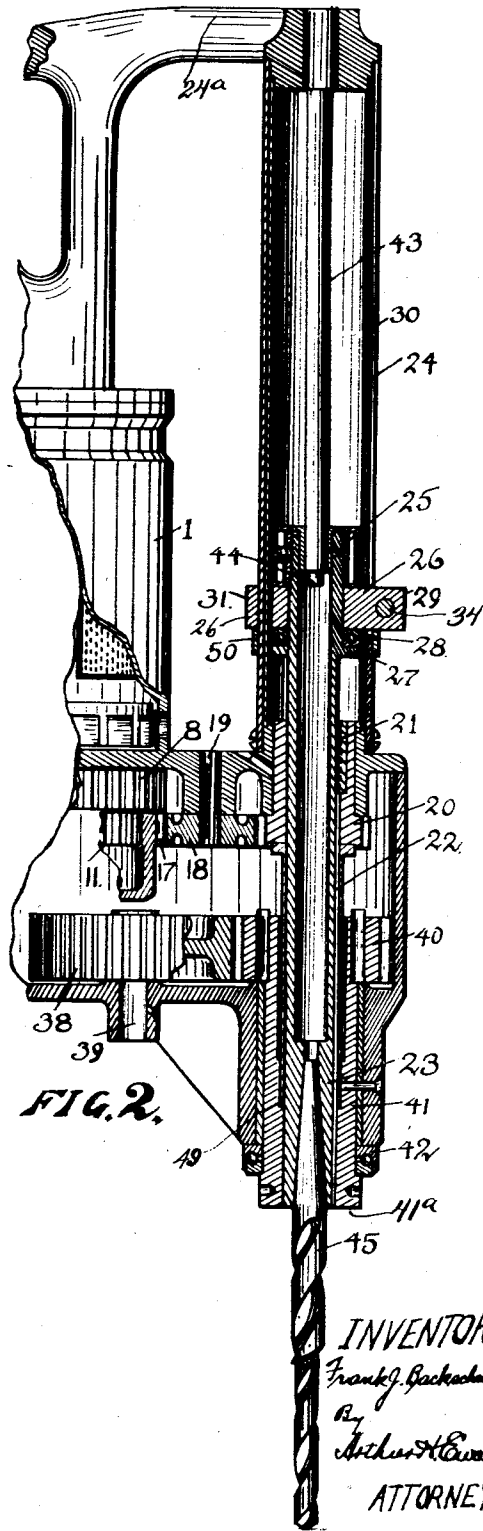
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1,216,047.

Patented Feb. 13, 1917.

2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

FRANK J. BACKSCHEIDER, OF CINCINNATI, OHIO.

POWER-DRIVEN TOOL.

1,216,047.

Specification of Letters Patent.

Patented Feb. 13, 1917.

Application filed April 7, 1913. Serial No. 759,268.

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 a part of this specification.

My invention relates to power driven tools, particularly to such as are portable, and relates specifically to a device in which provision is made for a plurality of tools, whereby a plurality of operations may be simultaneously performed, or a series of operations may be successively performed with a minimum delay in effecting the change from one tool to the other.

In various kinds of work, for instance in the setting of heavy lag screws, a series of operations is necessary in the setting of each screw, to-wit: the drilling of the necessary hole in which the screw is to be set, and the driving of the screw. To facilitate the performance of this work, it is necessary not only that each individual operation shall be speedily performed, but also that the change from one operation to the other shall be expeditiously effected. In other work the result may be greatly expedited by performing concurrently a plurality of operations; for instance in the threading and reaming of pipe for electrical work, the two operations, though performed by separate tools independently operating, may be done at one and the same time, this expediting the completion of the work.

It is one of the objects of my invention to provide a device for the accomplishment of the above results, that is, one in which provision is made for the concurrent and independent operation of a plurality of tools, whereby a plurality of operations may be performed concurrently or in rapid succession, thus facilitating the labor and expediting the result.

A further object of my invention is to provide a portable tool in which the handles are so arranged as to secure the device

against torsion in the hands of the operator during use.

Other objects of my invention will be made apparent in the detailed description hereinafter contained.

In the drawings:

Figure 1 is a side view of my new device, partly in elevation and partly in section; the device being equipped with drill and socket wrench;

Fig. 2 is a view of the device as illustrated in Fig. 1, but on a larger scale and with the drill and wrench in different relative positions; part of the device being also broken away;

Fig. 3 is an elevation of a portion of the device equipped with reamer and die, the latter in section;

Fig. 4 is a top view of the device;

Fig. 5 is a perspective of a section on line *a-a* of Fig. 1;

Fig. 6 is a perspective of the spindle casing;

Fig. 7 is a perspective of the spindle casing shutter;

Fig. 8 is a detail of the clutch members;

Fig. 9 is a detail of the switch.

The numeral 1 indicates the main casing of my new device; said casing is generally of cylindrical shape and contains the motor 2, the field frame of which is formed by the wall of the casing. Keyed onto the armature shaft 3 is the driving member 4 of a clutch, the driven member 5 of which clutch is adapted to turn freely on the lower end of the armature shaft. The member 4 of the clutch is adapted to slide on the armature shaft, and is normally held in engagement with the driven member 5 by means of a spring 6 so that uniformly the members of the clutch are in operative connection. Said clutch is, however, constructed generally in accordance with the specification filed by me on the 31st day of August, 1912, with my application for Letters Patent of the United States, Serial Number 718,100, and the members thereof preferably have shallow teeth as shown in Fig. 8, which force the members apart when either is subjected to abnormal friction, whereby the member 4 is caused to recede against the tension of spring 6 for the

purpose hereinafter set forth. Integrally formed with, or attached to, the member 5 of the clutch, is a pinion 7, adapted to intermesh with a spur gear 8 mounted on the pintle 9 secured to the diaphragm 10 of the casing. Also mounted on the pintle 9 is a pinion 11, which engages an internal gear 12 formed on the inside of the flange 13 of the gear wheel 14. The wheel 14 is secured to a shaft 15 which has its bearing in a boss 16 on the lower wall of the casing. The upper end of the shaft 15 is hollowed to receive the lower end of the armature shaft to furnish a bearing therefor. On the flange 13 of the wheel 14 is also an external spur gear 17, which intermeshes with the pinion 18 rotatably mounted on the pintle 19; the said pintle being mounted in an extension of the diaphragm 10, which extension forms the upper wall of a projecting portion of the casing. The pinion 18 intermeshes with a spur gear 20, suitably mounted in the upper wall of the projecting portion of the casing. Said spur gear 20 has a key 21 which engages a keyway 22 extending approximately throughout the length of the drill spindle 23; said spindle being adapted to slide longitudinally in the spindle casing 24 secured to the projecting portion of the casing 1. The upper end of said spindle casing is connected with the main casing by a handle, or rest, 24^a. By means of the gearing and arrangement of parts as above described, it will now be apparent that transmission of power from the motor to the drill spindle is duly provided for, as well as free longitudinal adjustment of said spindle with reference to said transmission. In order to effect such adjustment without interfering with the rotation of the spindle, the following mechanism is provided.

The upper end of the spindle is threaded to receive a nut 25, which is of greater diameter than the spindle, and thus provides an adjustable shoulder or flange on the end thereof, against the under side of which a ring 26, fitting loosely around the spindle, is adapted to bear. Below said ring the spindle is provided with a shoulder or collar 27, a ball raceway 28 being interposed between said shoulder and said ring to furnish a suitable bearing. On the ring 26 is a lug 29, which extends through a longitudinal slot 30 in the spindle casing to the outside thereof, as clearly shown in Fig. 5. A spring band 31 adapted to fit around the outside of the spindle casing and to grip the same when tightened is provided, and the same has lugs 32 and 33; said lugs and the lug 29 on the ring 26 have registering perforations through which a bolt 34 is inserted, the head of the bolt being held against torsion by the band 31 and an angular extension 35 of the lug 29. The han-

dle 36 is internally threaded to receive the threaded end of the bolt, and the end of said handle, when the handle is screwed onto the bolt, is adapted to abut against the lug 32 of the band 31, thus causing the band to grip tightly the spindle casing when the handle is screwed on to the bolt, and conversely, to permit the band, when the handle is unscrewed, to spring slightly away from the casing, loosening the parts. It will be understood that only a slight turn of the handle is necessary to effect the tightening or loosening of the band. By loosening the band 31, as above explained, it will now be seen that the drill spindle may be longitudinally moved at will in the spindle casing by means of the handle 36 which carries the ring 26; the latter bearing against either of the fixed shoulders 25 or 27 on the spindle; and that, during the adjustment the spindle may continue to rotate within the loose ring 26.

A second spindle is provided in my new device, the same being adapted to operate concurrently with the above described drill spindle, which, with the necessary transmission, I will now describe. Secured to the gear wheel 14 is a pinion 37, which intermeshes with a spur gear 38, mounted on a pintle 39 in a boss on the lower wall of the casing. The gear 38 intermeshes with a gear 40 keyed onto the upper end of the tool spindle 41, said spindle being rotatably mounted in an extension of the projecting portion of the casing. The drill spindle 23 and spindle 41 are concentric, and the latter is hollow to provide a passage for the drill spindle, when said drill spindle is adjusted for work, as shown in Fig. 2. In Figs. 1 and 2, I have shown the lower end of the spindle 41 constructed for use as a socket wrench, a suitable ball raceway 42 being provided.

The operation of the tool spindles of my new device will now be apparent to those skilled in the art, as well as the ready availability of either spindle, or of both spindles concurrently where desired, as in the threading and reaming of pipe illustrated in Fig. 3 of the drawings, in which the reamer is attached to the spindle 23 and the die to the spindle 41. To effect a ready removal of the drill from the adjustable spindle 23, I provide as follows: The spindle 23 has a hollow center, as shown in Figs. 2 and 5. Attached to the upper wall of the spindle casing is a rod 43, which is provided on its lower end with a punch 44. The rod fits into the hollow center of the spindle, and is of such length, that, when the spindle is moved to the limit of its upward movement, the punch 44 will tap the upper end of the drill 45 and cause it to drop from the spindle, whence it will, of course, drop through the hollow center of spindle 41.

To prevent the removal of the drill inadvertently when such removal is not desired, I provide a stop 46 pivotally mounted on the outside of the spindle casing; said stop 5 when turned down, as shown in Figs. 1 and 3, is adapted to limit, by its abutment against the band 31, the upward movement of the spindle 23, and thus to prevent the punch 44 from dislodging the drill. When 10 it is desired to remove the drill, the stop 46 is turned upwardly, as shown in broken lines, and the further movement of the spindle dislodges the drill as above set forth.

To prevent the accumulation of dust and 15 dirt in the spindle casing, I provide, inside said casing, a shutter 47, illustrated in detail in Fig. 7. Said shutter is tubular and of such diameter that it fits snugly inside the spindle casing, its inside dimension being sufficient to permit the sliding passage of the 20 ring 26. Said shutter is provided with a spiral slot 48, through which the lug 29 on the ring 26 extends and operates. It will thus be seen that the longitudinal movement 25 of the lug 29 in the straight slot 30 of the spindle casing, will revolve the shutter, and the opening of the spiral slot coinciding with that of the straight slot only at the point of passage of the lug 29, the slot of 30 the casing will be closed approximately throughout its whole length at all times. I also prevent the introduction of dust and dirt into the working parts of the device by means of a sleeve 49 attached to the lower 35 side of the gear 20, and which extends downwardly through the hollow center of the spindle 41 to a point near the lower end thereof.

On the spindle casing 24, below the gripping band 31, I place a band 50, which may 40 be secured at any desired point on the casing by means of the thumb screw 51; the purpose of said band is to furnish a ready means of setting the spindle at the proper point to 45 gage the depth or extent of the work to be done by the tool, the band limiting the downward movement of the spindle when lowering the tool for use by preventing the passage of the band 31.

The numeral 52 designates a switch for 50 controlling the current. In said switch, the contact points 53 and 54 are connected by the finger 55 of the switch-arm 56. Said switch-arm has an extension 57 carrying a 55 roller 58 through which it bears, when the switch-arm is in its "on" position, upon the driving member of the clutch. In Fig. 1 the switch-arm is shown in its "on" position in full lines and in its "off" position in broken 60 lines. When the member 4 of the clutch recedes against the tension of spring 6, as above explained, the switch-arm is thrown to its "off" position, thus cutting off the current and preventing the burning out of fuse 65 or armature.

On my new device, the handles 36 and 59 are placed at right angles with reference to each other, thus, during operation, the operator has complete control of the tool 70 against torsion in his hands, the grip of the handle in each hand being opposed against torsion of the opposite handle in the other hand, as will be readily apparent.

The operation and value of my device are best illustrated by examples of its use in certain kinds of work. Assume first that the 75 work to be done is the setting of heavy lag screws: The drill spindle 23 is first provided with a suitable drill, the band 50 is then set to gage the depth to which the drill 80 is to go; the handle 36 is next unscrewed slightly to loosen the gripping band 31 and the spindle is lowered until the band 31 strikes the band 50, the parts being then in the relative positions illustrated in Fig. 2, 85 in which the drill is ready for use. The current is then turned on. The drilling having been completed, the band 31 is loosened and then raised until it reaches the stop 46, when 90 the drill will be in the position shown in Fig. 1, and the socket wrench may be applied to the lag screw. When the screw is driven to the desired depth, any attempt to drive it further will overload the clutch and automatically cut off the current. During 95 both operations it will be understood that both spindles are in constant rotation.

In the threading and reaming of pipe, as 100 illustrated in Fig. 3, the operation of the device is similar, but both tools operate concurrently on the work. As shown and hereinbefore explained, the reamer is placed in the sliding spindle 23 and the die on the 105 fixed spindle 41. The reamer is so set relatively to the die, that each will perform its required amount of work, after which the tools will become overloaded, by reason of the die feeding the pipe to the reamer more 110 rapidly than the latter can continue to ream, and the current will be cut off as above explained.

When either drill or reamer is to be removed from the sliding spindle 23, the stop 46 is raised and the spindle brought to the 115 limit of its upward movement, when the tool will be instantaneously dislodged as hereinabove set forth.

The above examples are but illustrative of the operation of my new device, and are not to be taken as limitations either as to details of construction or as to its applicability to other classes of work, many of which 120 may obviously be performed with great facility and expedition by my device as above described or with such modifications as are 125 contemplated within the scope of my invention.

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

1. A device of the character specified comprising a casing, a tool spindle longitudinally adjustable in said casing, means for the actuation of said spindle, a handle slidably mounted on said casing and arranged to adjust said spindle, and means whereby, upon the turning of said handle said spindle will be locked in position when properly adjusted.
2. A device of the character specified comprising a casing, a tool spindle longitudinally adjustable in said casing, a bearing for said spindle, said bearing being slidably mounted in said casing for the adjustment of said spindle, means for the actuation of said spindle, a handle slidably mounted on said casing and arranged to slide said bearing therein, and means whereby, upon the turning of said handle said bearing and spindle will be locked in position when properly adjusted.
3. A device of the character specified comprising an adjustable tool spindle, means for the actuation of said spindle, a casing for said spindle, said casing being provided with a straight slot, a tubular shutter in said casing, said shutter having a spiral slot, and means attached to said spindle and extending through the slots in said shutter and said casing, whereby said spindle may be moved longitudinally in said casing and said shutter may be rotated to close the slot in said casing.
4. A device of the character specified comprising an adjustable tool spindle, means for the actuation of said spindle, a casing for said spindle, said casing being provided with a straight slot, a tubular shutter in said casing, said shutter having a spiral slot, means attached to said spindle and extending through the slots in said shutter and said casing, whereby said spindle may be moved longitudinally in said casing and said shutter may be rotated to close the slot in said casing, and means in said casing whereby a tool mounted in said tool spindle may be automatically dislodged.
5. A device of the character specified comprising a casing, two tool spindles mounted in said casing, one of said spindles being mounted in the end of said casing and the other spindle being arranged to operate in an opening through the center of said first spindle, a gear mounted on said second spindle for the actuation thereof, and a sleeve on said gear around said second spindle and extending into said first spindle to prevent the access of chips into said casing.
6. A device of the character specified comprising two tool spindles, one of said spindles being locally fixed in said device and having an opening through its center, and the other of said spindles being adapted to longitudinal movement through the opening in said fixed spindle, means for the actuation of said spindles, means whereby said second spindle may be moved longitudinally without interfering with the rotation thereof, and means to lock said second spindle in position when properly adjusted.
7. A device of the character specified comprising two tool spindles, one of said spindles being locally fixed in said device and having an opening through its center, and the other of said spindles being adapted to longitudinal movement through the opening in said fixed spindle, means for the actuation of said spindles, means whereby said second spindle may be moved longitudinally without interfering with the rotation thereof, and means whereby a tool mounted in said second spindle may be automatically dislodged.
8. A device of the character specified comprising two tool spindles, one of said spindles being locally fixed in said device and having an opening through its center, and the other of said spindles being adapted to longitudinal movement through the opening in said fixed spindle, means for the actuation of said spindles, means whereby said second spindle may be moved longitudinally without interfering with the rotation thereof, means automatically to dislodge a tool mounted in said second spindle, and means to lock said second spindle when properly adjusted.
9. A device of the character specified comprising two tool spindles, means whereby the relative positions of said tool spindles may be adjusted, means for the concurrent actuation of said spindles, and means to disconnect the power supply upon the overloading of either or both of said tool spindles.

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Witnesses:

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ARTHUR H. EWALD.