(Model.) 2 Sheets—Sheet 1.

F. P. BURKHARDT.

MECHANICAL MOVEMENT.

No. 470,176. Patented Mar. 8, 1892.

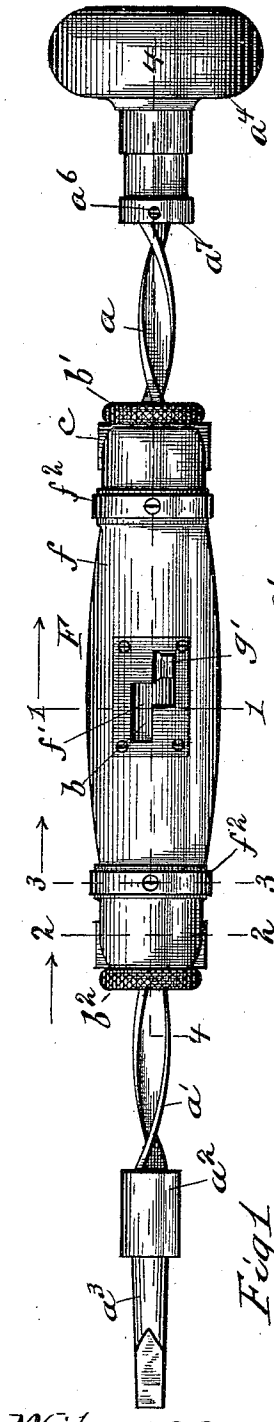

Fig 1

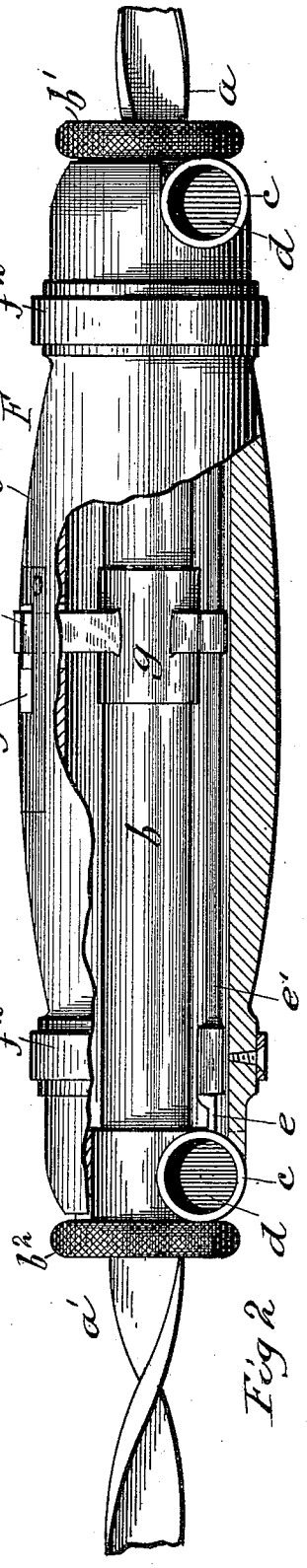

Fig 2

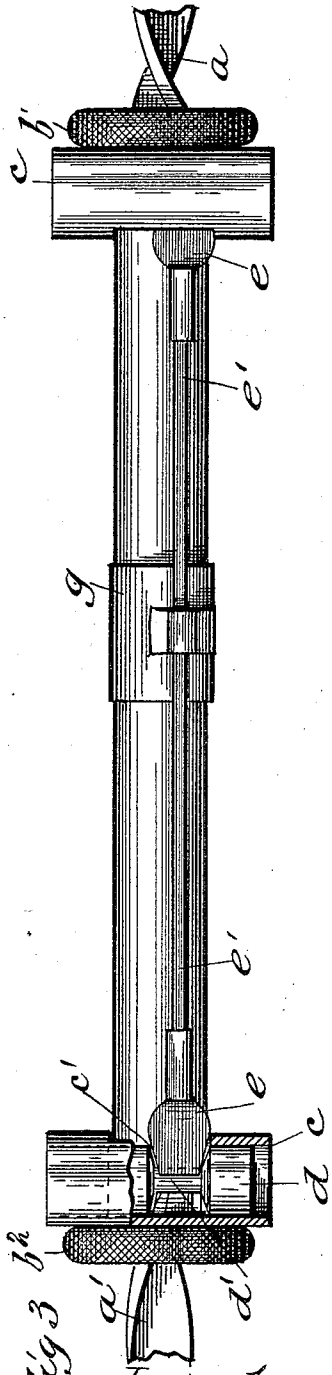

Fig 3

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2 Sheets—Sheet 2.

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ECHANICAL MOVEMENT.

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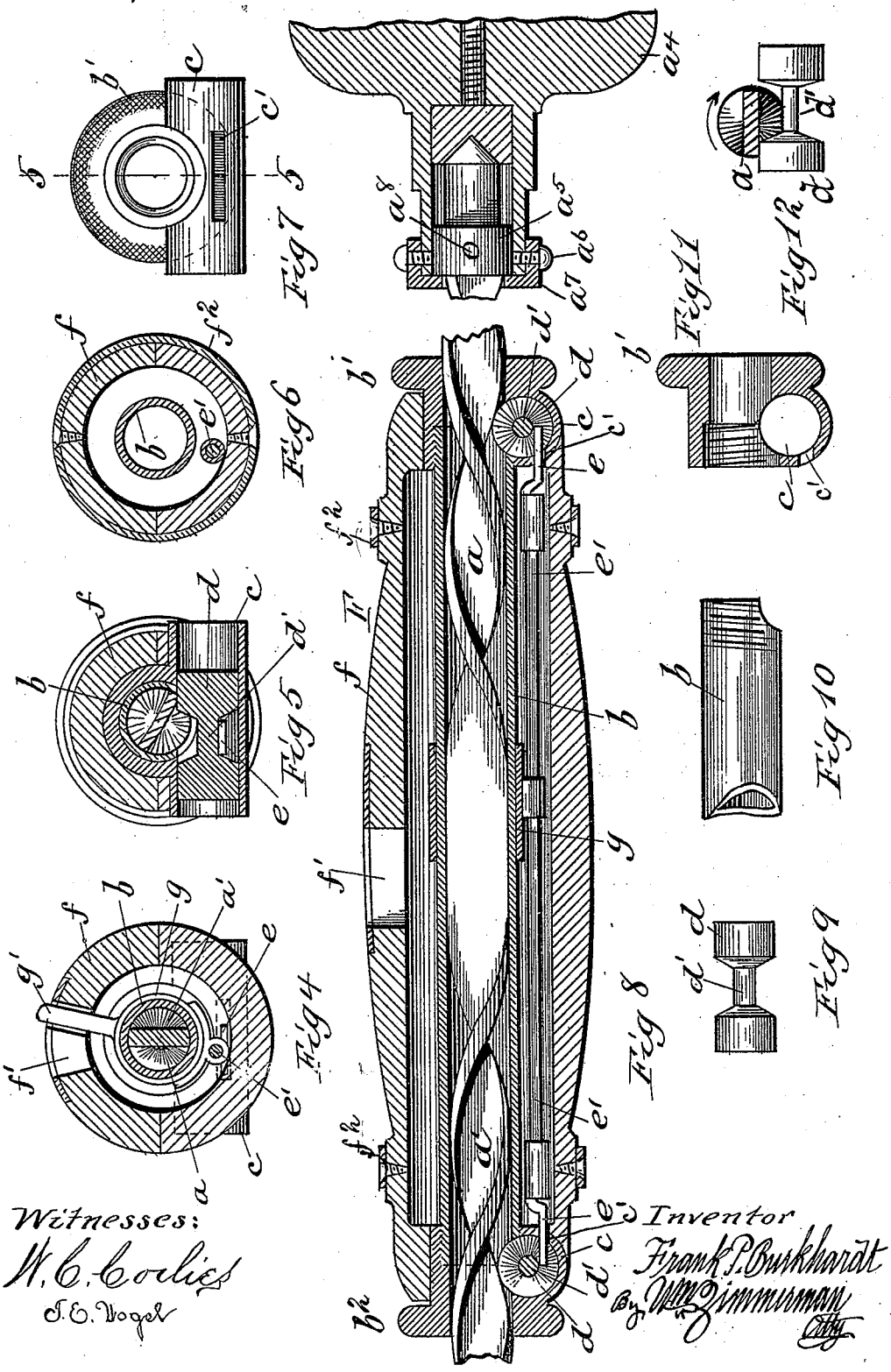

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UNITED STATES PATENT OFFICE.

FRANK P. BURKHARDT, OF SPOKANE FALLS, WASHINGTON.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 470,176, dated March 8, 1892.

Application filed March 1, 1890. Serial No. 342,293. (Model.)

To all whom it may concern:

Be it known that I, FRANK P. BURKHARDT, a citizen of the United States, residing at Spokane Falls, in the county of Spokane and State of Washington, have invented certain new and useful Improvements in Mechanical Movements, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part hereof, and in which—

Figure 1 shows my improved mechanical movement as applied to a screw-driver or drill, the same being seen from the upper side, or on that side which shows the handle of the shifting-gear. Fig. 2 shows Fig. 1 in side view on an enlarged scale, the ends being broken away and a part of the side broken out of the handle, the lower edge of which is shown in section. Fig. 3 shows Fig. 2 as seen on the under side opposite to that shown in Fig. 1, with the part *f* of the handle removed. Fig. 4 shows Fig. 1 on a transverse plane 1 1 of Fig. 1 when looking in the direction of the arrows. Fig. 5 shows Fig. 1 on a transverse plane at 2 2 of Fig. 1 when looking in the direction of the arrows. Fig. 6 shows a transverse view of Fig. 1 on the plane 3 3 of Fig. 1 when looking in the direction of the arrows. Fig. 7 shows one of the ends of the handle F, with its cylinder *c*, as seen from the interior side. Fig. 8 shows a vertical longitudinal central section of Fig. 2, with a fragment of the breast-piece or head. Fig. 9 shows one of the rollers *d*. Fig. 10 shows one end of the tube *b*, showing how it is cut and threaded to fit into the end piece *b'*, shown in Fig. 11. Fig. 11 shows a longitudinal section of Fig. 7, taken on the plane 5 5 of Fig. 7. Fig. 12 shows one of the rollers *d* and a spiral on it cut transversely at their point or line of contact.

Like letters of reference denote like parts.

The object of my invention is to construct an improved mechanic's tool, particularly a screw-driver and drill, whereby continuous rotary motion in opposite directions may be obtained at any instant at the desire of the operator without removing the tool from its work; and to attain said ends I construct my new and improved device substantially as follows, namely:

I take a strip of steel about one-eighth of an inch thick and about five-eighths or three-quarters of an inch wide and of required length and, beginning at its center, twist it in the directions of each of its ends, one-half into a right-hand and the remainder into a left-hand spiral, as *a* and *a'*. To one end of these spirals is attached a bit-holder a^2 for drills or screw-drivers a^3, and to the other end is attached a head or breast-piece a^4, which turns on a conical or other suitable end in a block or other familiar device, as clearly shown in Fig. 8. The said head may be held to the spiral by a removable ring a^5, held by a pin a^8, over which the tubular end of the head-piece passes to its lower edge, against which and the ring a^5 rests a cap a^7, held to the head-piece by screws a^6. The parts are thus free to turn on each other, but free from longitudinal motion. On the space between said parts a^2 and a^4 is the handle F, which occupies about or a little more than half of the space of the entire spiral. Said handle is composed of an internal tube *b*, which fits upon the said spirals, so as to just slide and turn freely on them, and is provided with end pieces *b' b²*, forming continuations of it, and into which it is threaded. Each of said end pieces carries a short transverse tube *c*, which cuts across the bore of the tube *b* as near its axial center as circumstances will permit, it being back of said point at least the semi-diameter to the connecting part *d'* of the roller *d* and also one-half the thickness of the spiral blades. Said tubes *c* are parallel to each other and provided with rollers *d*, which rest with one of their ends against their spirals *a a'*, as shown in Figs. 5 and 12. The central part of said rollers *d* is cut out so as to leave but a small connecting part *d'* between them. This permits the spirals to revolve through said cut-out space, as only one end of said rollers at any time can ever be in contact with said spirals to turn them, and both rollers must always be on the same side of the axial plane. There is a slot *c'* in each cylinder *c*, through which pass the ends *e* of a yielding or springing shifting-bar *e'*. Said ends are wide and flat, and their edges touch the roller *d*, so as to leave no lost motion between the parts, as clearly shown in Fig. 3. At the center of said bar *e'* is a lever *g*, which surrounds said rod and also surrounds the tube *b*, which latter forms its ful-

crum, from the upper side of which it extends in a solid bar or spur g' through a Z-shaped notch f' in the handle F, beyond the surface of which it projects a sufficient distance to be handled conveniently. Said lever g also slides longitudinally on its fulcrum and the rod e'. By means of this latter-described arrangement the operator is enabled to shift the rollers d from one end of the cylinder c to the other, and thus from one operating edge of the spirals to the other, and hold them in their place by sliding the lever g longitudinally, so that the spur g' will slide from one into the other of the longitudinal parts of the slot f'. The ends of the wooden casing f are cut away, so as to fit snugly on the ends b' b^2, and thereby the inner and outer parts of the handle F are prevented from turning upon each other, and the casing f is held upon the inner parts by means of rings f^2.

When all the said parts are constructed and put together, as shown and described, their operation is as follows, namely: To drive a screw, set the lever g, by means of the spur g', into that part of the slot f' which will throw the rollers d in such position against the spirals a a' as to cause them to revolve in the proper direction for that purpose, and then hold the head a^4 firmly and reciprocate the handle F as far as it can move in each direction. In doing so one of said rollers will be on that side of one of the spirals which will give that desired motion—as, for instance, on the spiral a. Then at the same time the roller on the spiral a' will remain idle until the motion of the handle is reversed, when it will come into action and the other roller become idle, the spirals thus contantly turning in the desired direction. If now we wish to withdraw the screw, we first shift the spur g' into the opposite end of the Z-shaped slot f', and in doing so the lever g' shifts the bar e', and thus throws the rollers toward the opposite ends of their cylinders, so that the ends of the rollers d become engaged with the opposite edges of the spirals a and a'. Then by reciprocating the handle, as before, the screw-driver will turn continuously in the opposite direction and turn the screw out.

The operation of the double spirals and their actuating-rollers may also be described as follows, namely: The active roller is constantly ascending an inclined plane, which recedes from under it. Both spirals turn between the heads of the rollers and are far enough to one side to lap on the heads of the rollers on the same side of the spiral axis. The head of the idle roller and its spiral only touch when the edge of the spiral and roller meet—twice at each revolution—due to the fact that its spiral has an opposite twist from that of its motion. Consequently the spiral touches the head on its inner end and, owing to the elasticity of the shifting-bar, pushes it along out of its way, which, after the spiral has passed the head, springs back to its place, and so on each time the head and spiral meet, and so, also, alternately for each spiral.

In Fig. 12 the active roller and spiral are shown in operation.

In Fig. 5 may be seen the condition of the idle roller and spiral, though on the opposite side from that shown in Fig. 12, and the spiral therefore turning in the opposite direction, the spiral having just passed the head of the roller and the roller sprung back into its normal position. It is evident that this arrangement will operate for any of the named purposes with greatly-increased speed over the former devices.

What I claim is—

1. In a mechanical movement, the combination, with a revolving and oppositely-spiraled shaft, of reciprocating, alternately-acting, connected, transversely-shifting, and yielding rollers to rotate said shaft, substantially as specified.

2. In a mechanical movement, the combination, with a revolving and oppositely-spiraled shaft, of reciprocating, transverse, alternately-acting, connected, and yielding rollers to rotate said shaft, substantially as specified.

3. In a mechanical movement, a shaft having supports and right and left hand spirals abutting on each other and carrying a non-rotating and reciprocating mechanism provided with transverse adjustable rollers adapted to shift longitudinally across the axial plane of said spirals by means of a longitudinally and transversely shifting lever connected by an intermediate spring-bar with said rollers and adapted to engage one or the other set of edges of said spirals, which said edges are situated on the same side of the axial plane of said shaft and rotate said spirals, substantially as specified.

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Witnesses:
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T. E. VOGEL.