(No Model.) 2 Sheets—Sheet 1.

F. W. WILLIAMS.

DRILL ATTACHMENT.

No. 561,036. Patented May 26, 1896.

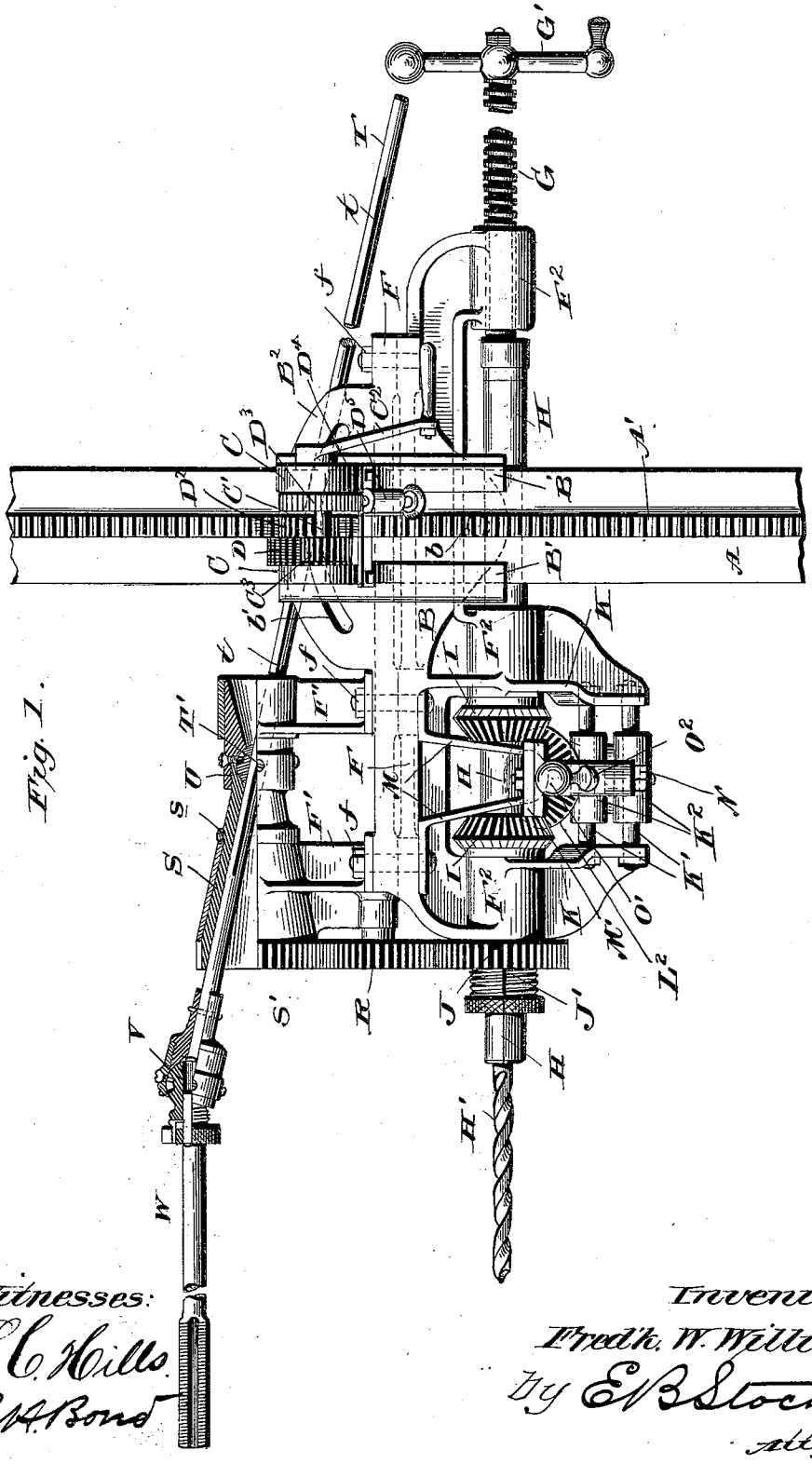

Fig. 1.

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Atty.

No Model.) 2 Sheets—Sheet 2.

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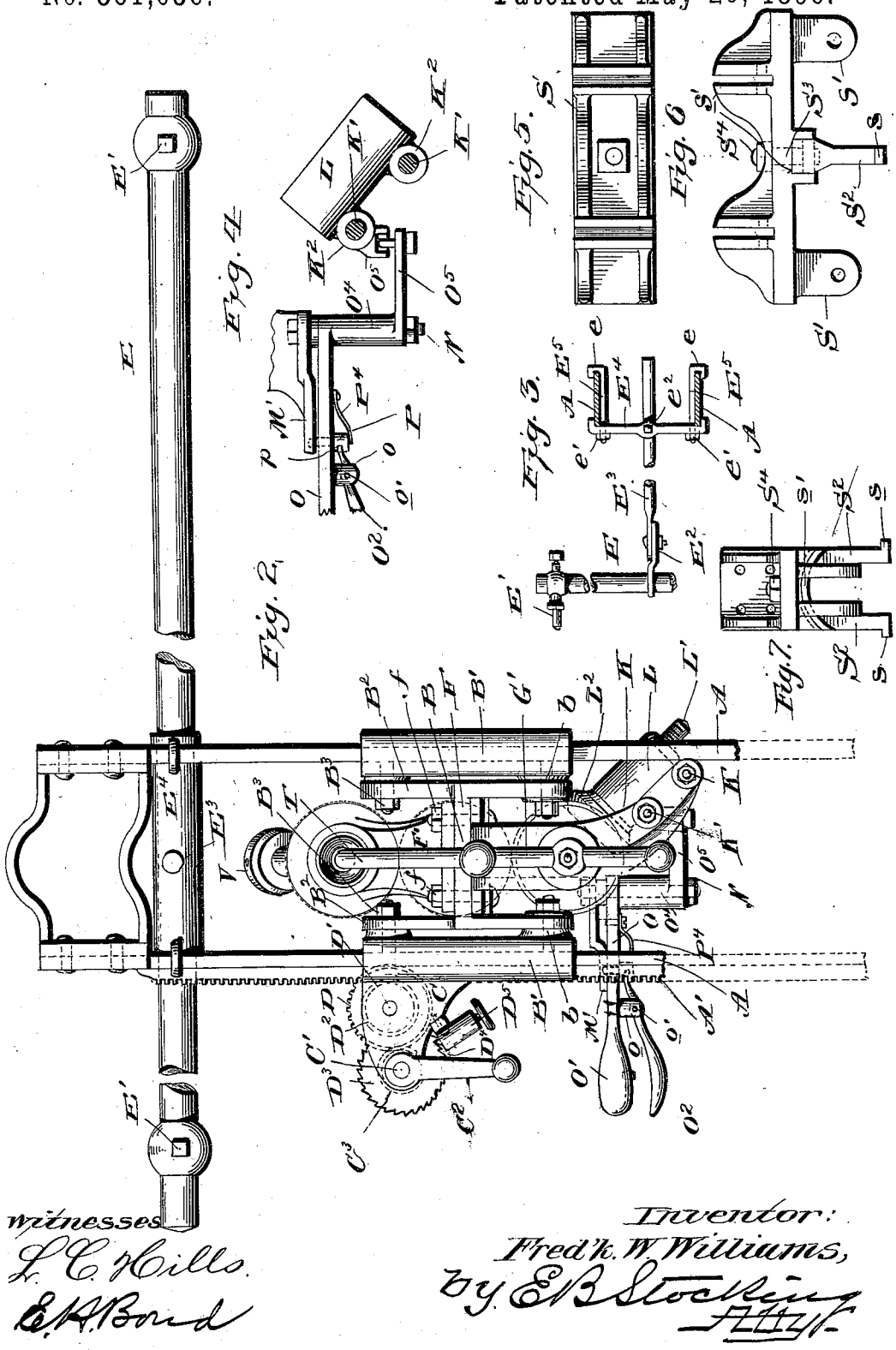

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Inventor:
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UNITED STATES PATENT OFFICE.

FREDERICK W. WILLIAMS, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF TWO-THIRDS TO T. E. CLARKE AND JOHN TONGE, OF SAME PLACE.

DRILL ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 561,036, dated May 26, 1896.

Application filed August 21, 1895. Serial No. 560,001. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK W. WILLIAMS, a citizen of the United States, residing at Minneapolis, in the county of Hennepin, State of Minnesota, have invented certain new and useful Improvements in Drill Attachments, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in drilling and tapping machines, having for its object, among others, to provide a simple and cheap attachment by which the tool may be operated at any desired height or angle. I provide means whereby the tapping attachment or tool may be at all times kept in a horizontal plane, regardless of the position of its actuating mechanism.

Other objects and advantages of the invention will hereinafter appear and the novel features thereof will be specifically defined by the appended claims.

The invention is designed more particularly as an improvement upon the construction shown in the Patent No. 530,979, issued to me December 18, 1894, one of the essential features of improvement being the provision of the tapping device arranged above and operated from the drilling mechanism by suitable gearing, the gear-wheel on the drilling-mandrel being made removable, so that when the tapping attachment is not in use it can be thrown out of gear. Various other novel features are embodied in the invention, which will be more fully set forth later on.

The invention in this instance is clearly illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this specification, and in which—

Figure 1 is an elevation of the present improvements with a portion in section and parts broken away. Fig. 2 is a view at right angles to Fig. 1 with the rod or top stay broken. Fig. 3 is a detail, partly in plan and partly in section, of the top stay from the machine to the boiler. Figs. 4, 5, 6, and 7 are details more specifically described later on.

Like letters of reference indicate like parts throughout the several views in which they appear.

Referring now to the details of the drawings by letter, A designates the vertical bars of the machine, adapted to be suitably mounted, as upon a truck (not shown) similar to that illustrated in my patent aforesaid, and one of which is provided with a rack portion A′, as seen in Figs. 1 and 2.

B is the supporting-frame, vertically adjustable upon the bars A and adapted to support the operating parts of the device. This frame consists of the side portions B′, which embrace the bars A, so as to slide thereon, as seen in Figs. 1 and 2, and the plates B^2, which are pivotally mounted thereon at their lower ends, as at *b*, and at their upper provided with the curved slots *b*′, as seen best in Fig. 1, through which slots pass the bolts B^3, as seen in Fig. 2, and which engage in the bars B′, and by this means the plates and the operating parts which they carry can be adjusted to the required angle and there held by the tightening of the bolts in a manner which will be readily understood. The parts carried by this frame will soon be described; but it is deemed advisable to first describe the mechanism by which the frame is adjusted vertically.

The side bars B′, which slide upon the bar A, that carries the rack-bar, are formed with brackets or lugs C, in the outer ends of which is journaled the shaft C′, extended at one end and provided with a crank-handle C^2, by which it may be turned, and upon this shaft is fast a gear-wheel C^3, which is adapted to mesh with a larger pinion D on a shaft D′, supported in the brackets or lugs C, and this shaft in turn carries a small gear that meshes with the rack A′. By means of this multiple gear but little power is required to elevate the frame and its accessories when desired. On the shaft C′ is a ratchet-wheel D^3, with which is adapted to engage the pawl D^4, mounted to move in a suitable casing D^5 on the bracket C at a point substantially under the shaft D′, which carries the gears D and D^2, as shown best in Fig. 2. This holds the frame and its accessories in their elevated position.

The bars A are suitably braced at their upper ends, as by the devices shown at the top of Fig. 2, and the upper end of the machine is stayed to the boiler or other device to be

operated upon as follows: E is a rod arranged horizontally, and near each end it is provided with some suitable means E′ for tapping into the boiler or otherwise engaging the same to hold the rod firmly in position, and to this rod is secured a bar or arm E^2, preferably sleeved thereon, as seen in Fig. 3, and offset, as shown in the same view, and to this bar or arm is adjustably secured in any suitable manner, as by slot and bolt, as shown, the bar or arm E^3, the other end of which passes through an opening in the plate E^4, the ends of which are bent at a right angle thereto and engage over the edges of the bars A, as shown best in Fig. 3, and this plate is held to the said bars A by the bolts E^5, the ends of which are bent upon themselves, as seen at *e*, to embrace the opposite edges of the bars, and the plate and bars are clamped together by means of the nuts *e′* on the ends of the bolts, all as clearly shown in Fig. 3. By this means the rod E may be adjusted to or from the machine, as occasion may require. The plate E^4 has tapped therethrough vertically an opening for the reception of the set-bolt e^2, as seen in Fig. 3, to engage and hold the bar E^3 therein.

Suspended from the plates B^2 are the longitudinally-disposed plates F, secured together in any suitable manner, as by the bolts and nuts *f*, as shown in Figs. 1 and 2, and mounted upon the plate F are the uprights F′, which are secured thereto by the said bolts *f*, as seen in said Figs. 1 and 2, these uprights forming bearings for parts which will soon be described. The plate F has depending therefrom the tubular portions F^2 in line with each other, the outer one being internally threaded to receive the screw G, which is provided with a suitable handle G′ and is adapted for feeding the drill to its work, as will be readily understood from Fig. 1.

H is the drilling-mandrel, passed through the hubs of the bevel-gears I and provided at one end with any suitable means for holding the drill or tool H′, while against the other end bears the screw G, as shown in Fig. 1. The bevel-gears are splined on the mandrel, so that the latter may move endwise therein, and the bevel-gears are mounted in the tubular portions F^2 of the lower plate F, and upon the shaft or hub of the bevel-gear farthest from the screw G is detachably mounted a gear-wheel J, which may be detachably affixed thereon in any suitable manner, as by a split tapered boss or sleeve J′, exteriorly threaded, as shown in Fig. 1, and which, as the nut is screwed up, tightens on the shaft and secures the wheel against slipping out of gear or off altogether. When it is desired to remove the gear-wheel, all that is necessary is to unscrew this sleeve and the wheel may be taken off.

The lower plate F is provided beyond the tubular portions F^2 with the depending webs or ribs K, in which are supported removably the rods K′, which extend parallel with the mandrel H, as seen best in Fig. 1, and upon these rods are mounted to slide the sleeves K^2, upon which is fixed the inclined bearing L for the shaft L′, carrying the bevel-gear L^2, which is mounted to mesh with either of the bevel-gears I, and to this shaft is designed to be conveyed the power from any suitable source in any suitable manner, preferably by means of a flexible connection, (not shown,) so that the parts may be moved about as desired.

Depending from the lower plate F are the brackets or arms M, secured thereto in any suitable manner, as seen best in Fig. 1, and at the lower ends there is secured the horizontal plate M′, having a plurality of holes, while from this plate depends the fulcrum-stud N, upon which is pivotally mounted the lever O, provided with a suitable handle O′, and depending from this lever is a stud *o*, upon which is pivotally mounted, as at *o′*, the lever O^2, the inner end of which engages in a notch *p* of the pin P, which is mounted to slide vertically in a hole in the lever O, as seen best in Fig. 4, this pin being adapted to engage any one of the holes in the plate M′ to hold the bevel-gear L^2 in mesh with either of the bevel-gears I or out of mesh with both. This pin is urged upward by a spring P^4, secured at one end to the under side of the lever O, as seen in Figs. 2 and 4.

The lever O carries a depending sleeve O^4, embracing the fulcrum-stud N, as seen in Figs. 2 and 4, and this sleeve at its lower end carries the horizontal arm O^5, in the free end of which is an oblong hole parallel with the arm O^5, through which passes a screw-bolt which screws tightly into the lug O^5, which projects down directly over the center of one of the sleeves K^2, as seen in Fig. 4, so that as the lever O is moved the sleeves and their bearing L and the bevel-gear L^2 will be moved in one direction or the other according to the direction in which the lever is moved. As the lever is moved the pin P will be forced into the hole in the plate M′ and hold the bevel-gear L^2 in engagement with the desired one of the bevel-gears I or out of engagement with either, as may be required.

Mounted on a stub-axle supported in one of the brackets F′ is a gear-wheel or pinion R, meshing with the gear J, as clearly shown in Fig. 1. Mounted to revolve in the bearings on the uprights or brackets F′ is the double conical part S, having at its larger end a gear-wheel or pinion S′, meshing with the pinion R, as seen in Fig. 1, the collar *s* being secured to the said part and bearing against the outer bearing, as shown in the same view. The tapping-spindle T passes through this double conical part, as shown best in Fig. 1, and is provided with a keyway *t* throughout its length, as seen in Fig. 1. This spindle works in a ball U, mounted in a universal bearing in the double conical part, as shown, the said ball carrying the key T′, and at the tapping end this spindle has another ball-joint V, as shown best in Fig. 1, which enables the tap W, which is held therein in any suitable manner and which construction

enables the tap to adjust itself in line with the hole, to be tapped even though the tapping-spindle be arranged at as great an angle as is illustrated in Fig. 1.

With the parts constructed and arranged substantially as shown in the drawings, the operation will be readily understood, especially when taken in connection with the above description, and a further detailed description thereof is not deemed necessary.

Modifications in detail may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages. The uprights A A are mounted so as to be turned, as in the patent hereinbefore mentioned, but by what I consider a somewhat improved construction and arrangement of parts, as seen in Figs. 5, 6, and 7, which are respectively a plan, side, and end elevation of the lower end of the uprights or bars A A, and the means by which connection is made with the truck or carriage S, and provided with the depending yokes S′, in which are designed to be supported suitable rollers to run upon the truck-bed. A central yoke S^2, having the lateral portion *s* to run in the groove of the truck, is provided with a central slot *s′*, through which passes a bolt S^3, and this bolt passes up through the roller-bracket and is provided with a nut S^4 upon its upper side. By loosening the nut the bars or uprights can be tipped backward or forward more or less, the limit being about twenty degrees from the perpendicular. When in their adjusted position, the nut is tightened and the bars will be held in the position to which they are adjusted, thus giving to the drill a much greater angle. Other changes in detail may be resorted to and still be within the scope of my invention.

What is claimed as new is—

1. The combination with the uprights and the frame mounted thereon for vertical adjustment, of the plates mounted on the frame for angular adjustment, and the drilling and tapping devices comprising a double conical part carried by said plates, substantially as specified.

2. The combination with the uprights and the frame mounted thereon for vertical adjustment, of the plates mounted pivotally on the frame, the bevel-gears mounted in bearings on the said plates, the drill and the tapping attachment mounted on said plates comprising a double conical part and constructed to be driven from the drill-operating mechanism, substantially as specified.

3. The combination with the uprights and the adjustable frame with its pivoted plates, of the drill-operating mechanism mounted upon said plates, the double conical part mounted above the drill-operating mechanism and interposed gearing whereby the tapping mechanism is operated from the drill mechanism, as set forth.

4. The combination with the uprights, the frame and its pivoted plates, of the drill-operating mechanism mounted upon said plates, a double conical part mounted above the drill-operating mechanism, tapping mechanism mounted in said double conical part, and interposed gearing one of which is removably mounted, substantially as specified.

5. The combination with the double conical part, of the tapping-spindle passed therethrough and adjustable therein and having a ball-joint at the end and a ball-bearing between its ends in said double conical part, and mechanism for operating said spindle, substantially as specified.

6. The combination with the double conical part and its bearings, of the drill-operating mechanism, a gear removably mounted thereon, a gear on one end of the conical part and an interposed gear meshing therewith whereby the tapping device is operated from the drill-operating mechanism, as set forth.

7. The combination of the frame, the rods, the sleeves adjustably mounted upon said rods, the bevel-gear bearing carried by said sleeves, the lever pivotally mounted and carrying an arm engaging one of the sleeves, the plate with openings, and the auxiliary lever carrying a vertical pin adapted to engage any one of said openings, substantially as and for the purpose specified.

8. The combination of the stay-rod and its securing means, the uprights, and the adjustable connection shown and described between said rod and the uprights, as set forth.

9. The combination of the uprights, the frame adjustable thereon, the plates pivotally mounted on the frame, the drill-operating mechanism carried by said plates, means for adjusting the frame vertically, means for adjusting the plates angularly, and the tapping mechanism and interposed devices whereby the latter is operated from the drill mechanism, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK W. WILLIAMS.

Witnesses:
T. E. CLARKE,
ALBERT E. CLARKE.