

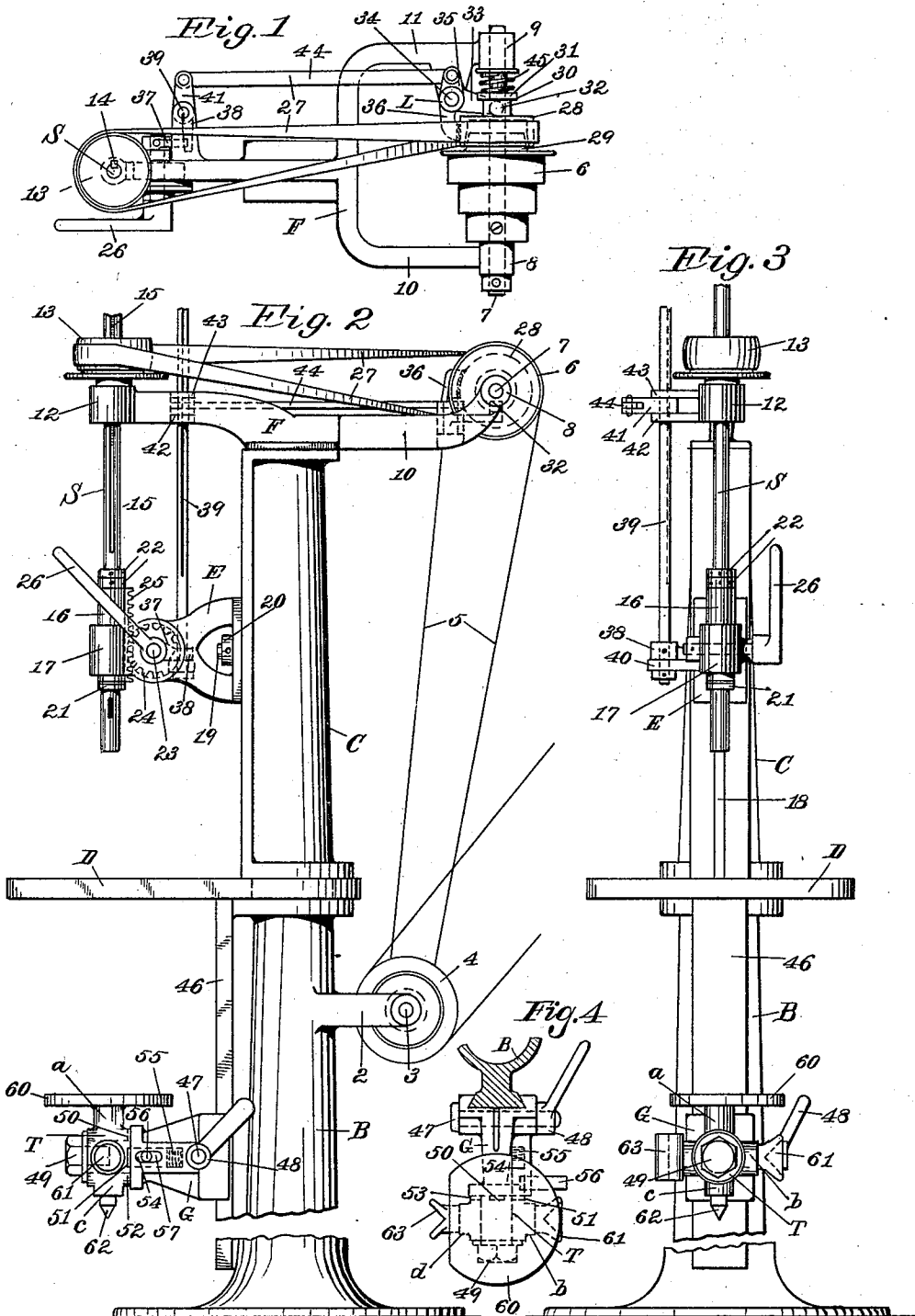
(No Model.)

2 Sheets—Sheet 1.

E. E. CLAUSSEN.
DRILLING MACHINE.

No. 463,659.

Patented Nov. 24, 1891.



Witnesses:

H. Mallner.
Henry L. Rickard.

Inventor.

Edward E. Claussen

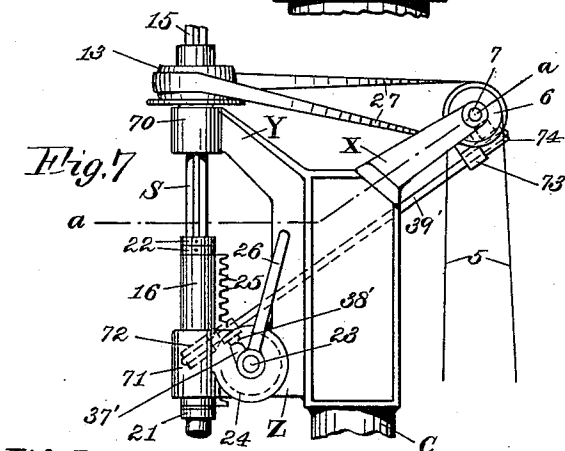
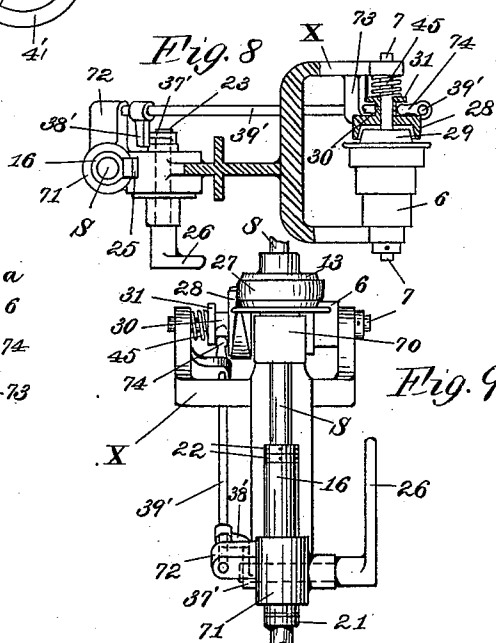
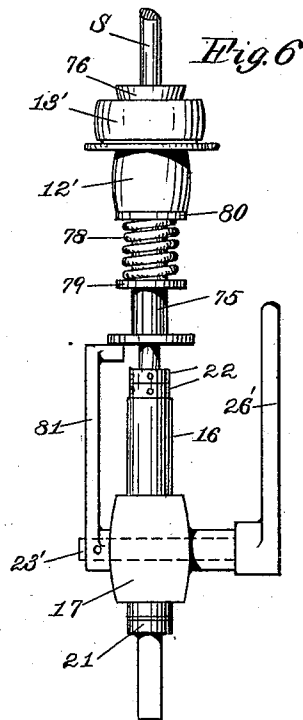
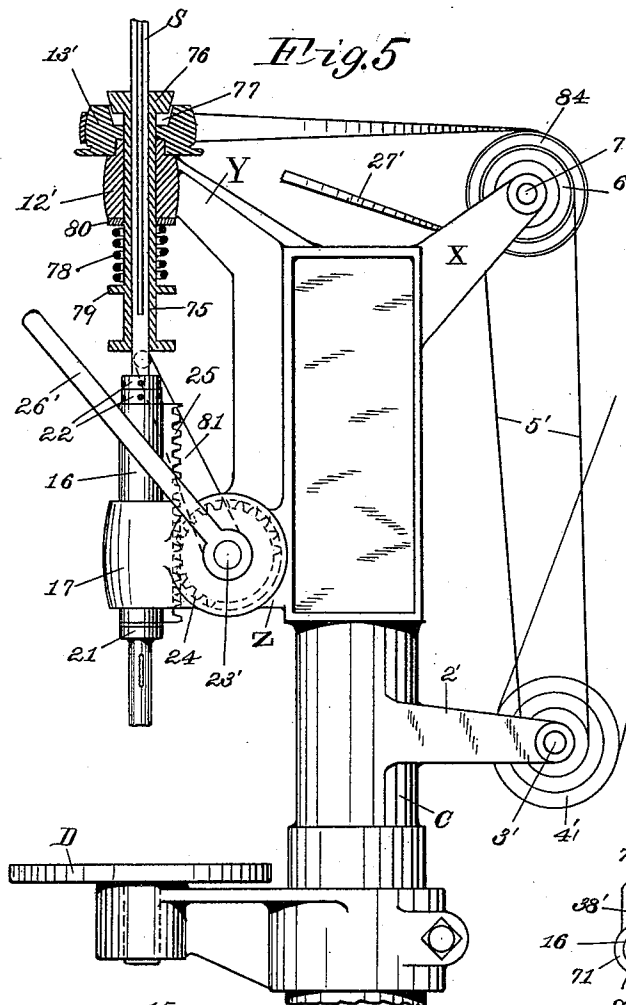
(No Model.)

2 Sheets—Sheet 2.

E. E. CLAUSSEN.
DRILLING MACHINE.

No. 463,659.

Patented Nov. 24, 1891.



Witnesses:

H. Mallner.
Henry L. Rickard.

Inventor:

Edward E. Claussen

UNITED STATES PATENT OFFICE.

EDWARD E. CLAUSSEN, OF HARTFORD, CONNECTICUT, ASSIGNOR TO REINHOLD HAKEWESSEL AND LOUIS H. WITTIG, OF SAME PLACE.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 463,659, dated November 24, 1891.

Application filed October 5, 1891. Serial No. 407,800. (No model.)

To all whom it may concern:

Be it known that I, EDWARD E. CLAUSSEN, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Drilling-Machines, of which the following is a specification.

This invention relates to that class of drilling-machines usually designated "sensitive" drills, the principal object being to provide for that class of drilling-machines improvements for automatically starting and stopping the machine from the movement of the spindle-slide actuator.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan view of the upper portion of an upright drilling-machine embodying my present invention. Fig. 2 is a side elevation of the drilling-machine. Fig. 3 is a front elevation of the machine. Fig. 4 is a plan view of the work-holding fixture carried upon the forward side of the machine below the swinging table. Fig. 5 is a side elevation, partially in section, of a modification of the improvement. Fig. 6 is a front view of certain parts shown in Fig. 5. Fig. 7 is a side elevation of another modification of the improvement. Fig. 8 is a sectional plan view in line *a a* of the modification shown in Fig. 7. Fig. 9 is a front view of the modification shown in Figs. 7 and 8.

Similar characters designate like parts in all the figures.

Referring to Figs. 1, 2, 3, and 4, the drilling-machine shown therein has an upright column consisting of the lower column B and the upper column C, joined together in a well-known manner or formed integral, as may be preferred. Between said upper and lower columns the machine is shown provided with the usual swinging work-table D, which is journaled upon the columns or frame-work, to be swung under and from under the drill-spindle in the usual manner. The lower column B is or may be provided with a bracket 2, (see Fig. 1,) carrying the counter-shaft 3, furnished with the driven pulley 4 and with a cone-pulley, (not shown,) from which, by means of the belt 5, is driven the cone-pulley 6 of the driving-shaft 7 of the drilling-machine. Said driving-shaft 7 is shown carried

in bearings 8 and 9, formed on the rearward ends of the arms 10 and 11 of the top frame F, which frame is rigidly fixed to the upper end of the aforesaid column C of the drilling-machine. At the forward end thereof said top frame F is provided with the bearing 12 for the upper end of the drill-spindle S, which carries thereon above said bearing the spindle-driving pulley 13, splined to said spindle by the key 14, fixed in said pulley and sliding in the slot or spline 15 in the spindle. The lower end of the drill-spindle S is carried by the usual "quill" or spindle-slide 16, which is fitted to slide vertically in the bearing 17, formed on the vertically-adjustable spindle-bracket E, which is fitted to slide up and down on the front side of said upper column C, being connected to said column by the usual T-slot 18 (see Fig. 3) and the bolt and nut 19 and 20, Fig. 2.

For locating the spindle within its said slide 16 a shoulder or collar 21 is formed on said spindle at the lower end of said slide, and the usual collars or nuts 22 are adjustably fixed on the spindle at the upper end of said slide, as will be understood from Figs. 2 and 3.

For imparting the required vertical movement to the slide 16 in the bracket E, said bracket is provided with a spindle-slide actuator, which may be constructed as follows: The shaft 23 is journaled in said bracket and carries fixed thereon a pinion or gear 24, whose teeth mesh with the teeth of the rack 25, which is formed on said slide, as illustrated in Fig. 2. For actuating said shaft by hand, it is furnished with the hand-lever 26. The shaft 23, gear 24, and hand-lever 26, together with the rack on the spindle-slide, constitute in the present instance that element of the mechanism which I denominate the "spindle-slide actuator," and whose particular construction may be modified in various ways within the scope and limits of my invention, in accordance with the practice usually prevailing in the drilling-machine art.

For actuating the drill-spindle from the driving-shaft 7, said shaft is furnished with a driving-pulley 28, mounted to revolve freely thereon, and said driving-pulley is connected to drive the spindle-pulley 13 by means of the belt 27, which, owing to the arrangement

of the mechanism shown in the drawings, is in this instance a quarter-turn belt, as shown in Figs. 1 and 2. For starting and stopping said driving-pulley 28, the cone-pulley 6 (or the driving-shaft 7) is provided with the friction-cone 29, (or other well-known form of clutch,) and said driving-pulley is constructed to engage the same. This may be effected by a sliding movement of said driving-pulley 28 on its shaft, and for effecting this sliding movement an angle-lever may be employed as follows: The driving-pulley 28 has the projecting hub 30, terminating in the collar 31. A pin or roller 32 fits in the groove formed between the pulley-web and said collar, as illustrated in Fig. 1, said pin being carried by the arm 33 of the rocker or angle-lever L, which is mounted on the stud 34, that is fixed in the frame F. Said rocker L carries the arm 35, whereby it is operated, and the friction-arm 36, which, on the outward sliding movement of the driving-wheel, engages the face of said wheel between the two runs of the belt 27, as will be understood by comparison of Figs. 1 and 2.

According to my improvements the rocker L is operatively connected with the spindle-slide actuator by suitable connecting devices, whereby on the first downward movement of the drill-spindle said driving-wheel 28 will be thrown into engagement with its driving-shaft or pulley and said drill-spindle be thereby started rotating. For this purpose said actuator-shaft 23 is provided with the clutch-actuating arm 37, which indirectly engages with the clutch that comprises a part of the spindle-rotating apparatus. Said arm 37 engages with and actuates a corresponding arm 38, fixed upon a shaft 39, whose lower end is journaled in a bearing 40, formed on said adjustable bracket E. Said connecting-shaft 39 passes through and is splined to the arm 41, which is carried by the bearings 42 and 43 of the top frame F, as will be understood by comparison of Figs. 1, 2, and 3. The outer end of the arm 41 is connected by a rod 44 to the aforesaid short arm 35 of the rocker L, so that on the turning of said splined connecting-shaft 39 said rocker is actuated to throw the driving-pulley into engagement or out of engagement with its driving-clutch, as may be required. A spring 45 (see Fig. 1) is provided for normally holding said driving-wheel in engagement with the opposite clutch-face, said connecting devices intermediate to said spindle-slide actuator and said driving-wheel being in the present instance only used for withdrawing said driving-wheel from engagement with said opposite clutch-face.

The adjustable fixture hereinbefore referred to, and shown in Figs. 2, 3, and 4, consists of the bracket G, fitted upon the way 46 of the lower column B and provided with the clamp-bolt 47 and handle-nut 48, whereby said bracket may be clamped to said way in a well-known manner, which will be under-

stood from Fig. 4. The outer end of said bracket constitutes a journal, on which is mounted the revoluble fixture or turret T, having in the present instance four arms and adapted to be set in four successive positions on said bracket, being clamped thereto by means of the nut or screw 49. The rearward side of the hub of said turret is provided with a series of lock-pin notches 50, 51, 52, and 53 for receiving the outer end of the lock bolt or pin 54, which pin is forced outward by a spring at 55, Figs. 2 and 4, and may be operated by a projecting pin or handle 56, which is fixed in said lock-pin and projects through the slot 57, formed in said bracket, as will be understood from Fig. 2. The turret T is furnished with four arms, of which the arm *a* is provided with the table 60, the arm *b* with the cup 61 for receiving the lower end of a shaft or like part, the arm *c* with a center 62 for receiving the lower end of a centered shaft, and the arm *d* with a V or channel 63 for receiving and centering a shaft horizontally. By loosening the nut 49 and then withdrawing the lock-pin 54 said turret may be revolved to bring either one of said arms to the upper side into its working position. In the drawings the arm *a*, having thereon the small work-table 60, is shown in said upper or working position.

In Figs. 7, 8, and 9 is shown one modified arrangement of the spindle-slide-actuating mechanism. In said figures the upper column C is shown provided with bracket X for carrying the driving-shaft 7, to which is fixed a cone-pulley 6, that is provided with the friction-cone 29. The driving-pulley 28 and the spring 45 are also carried on the shaft 7, as hereinbefore described in connection with Figs. 1 to 4, inclusive. A bracket having arms Y and Z, provided with bearings 70 and 71 for the spindle S and spindle-slide 16, respectively, is fixed to or formed on the upper end of the column C. The arm Z carries the shaft 23, which has the hand-lever 26 and an arm 37', (similar to arm 37 above described,) which engages with and actuates a corresponding arm 38', fixed upon a shaft 39', whose lower end is journaled in a bearing 72, that is also formed on or carried by said arm Z. The shaft 39' is similar to shaft 39 above described, except that it stands at an angle and connects directly with the clutch-actuating arm, instead of indirectly. The shaft 39' is carried at one end by the upper and outer bearing 73, which is fixed to or formed on the frame X. An arm or lever 74 is fixed to the shaft 39' outside said bearing 73, which arm may engage the grooved hub of the sliding driving-pulley 28, substantially as shown. On the turning of the shaft 39' the pulley 28 is thereby thrown into or out of engagement with the pulley 6 in a manner substantially the same as described in connection with Figs. 1 to 4, inclusive.

In Figs. 5 and 6 of the drawings I have shown another modified form of the machine.

In said Figs. 5 and 6 the upper column C is shown provided with supports X, carrying bearings for the shaft 7, on which are located the pulleys 6 and 84. The pulley 6 is driven by a belt 5' from the driven pulley 4' on the shaft 3', this shaft being journaled in bearings on the bracket 2' of the column C. The pulleys 6 and 84 are fixed to the shaft 7, and a belt 27' transmits power from said pulley 84 to a pulley 13', which is fixed to a sleeve 75, that is splined to the spindle S. Said sleeve 75 is carried in a bearing 12', formed on the arm Y of the column C, and has formed on its upper end a friction-rim 76, which engages a corresponding recess 77, formed in the pulley 13'. A spring 78, which is carried on the sleeve 75 between the fixed collar 79 and the loose collar or washer 80, serves to hold the friction-rim 76 normally in engagement with the pulley 13', thereby rotating the spindle S from the said pulley. The arm Z of the column C carries a shaft or stud 23', to one end of which is fixed a lever 26'. To the opposite end of said shaft is fixed an arm 81, which extends upward and engages the lower end of the sleeve 75. When the operator, by means of the lever 26', the pinion 24, and the rack 25, raises the drill from the work, the arm 81 operates, after the manner of a cam, to raise the sleeve 75 and disengage said friction-rim 76 from the pulley 13', thereby stopping the spindle.

Having thus described my invention, I claim—

1. In a drilling-machine, the combination, with the spindle-slide and the spindle carried thereby, of spindle-rotating apparatus comprising a clutch, and the spindle-slide actuator engaging said slide and having a clutch-actuating arm connected, substantially as described, with said clutch to engage and disengage the same on the downward and upward movements, respectively, of said slide, substantially as set forth.

2. In a drilling-machine, the combination, with the column thereof and with the bracket vertically adjustable on said column and adapted to carry the spindle-slide, the spin-

dle-slide actuator, and the lower end of the shaft 39, of the spindle-slide, the spindle-slide actuator, the drill-spindle carried by said slide, the shaft 39, carried at the lower end thereof by the bracket E and having a projecting arm, the clutch-actuating arm on said spindle-slide actuator engaging said shaft-arm to actuate said shaft, spindle-rotating apparatus comprising a clutch, and connections, substantially as described, actuating the clutch from said shaft, substantially as set forth.

3. In a drilling-machine, the combination, with the shaft carrying the friction-cone, of the friction-pulley fitted to slide on said shaft, the rocker having an arm actuating said friction-pulley to engage and disengage the same with and from said cone, a brake-arm on said rocker engaging said pulley when the pulley is thrown out of engagement with the friction-cone, and means for actuating said rocker by hand to disengage the pulley, substantially as set forth.

4. In a drilling-machine, the combination, with the bracket carrying the spindle-slide and adapted to carry the spindle-slide actuator, of the spindle-slide actuator engaging said slide and having the cam-arm 37, the shaft 39, having the arm 38 actuated by said cam-arm, spindle-rotating apparatus comprising a clutch, and clutch-actuating devices, substantially as described, operated from said shaft to actuate the clutch on the movement of the spindle-slide actuator, substantially as set forth.

5. In a drilling-machine, the combination, with the column having the way 46, of the bracket G, adjustable thereon and adapted to carry the turret, the turret T, journaled on said bracket, means for setting the turret in successive positions, and a series of workholding devices located on the turret in corresponding successive positions, substantially as shown and described.

EDWARD E. CLAUSSEN.

Witnesses:

HENRY L. RECKARD,
HANS MALLNER.