No. 766,883. PATENTED AUG. 9, 1904.

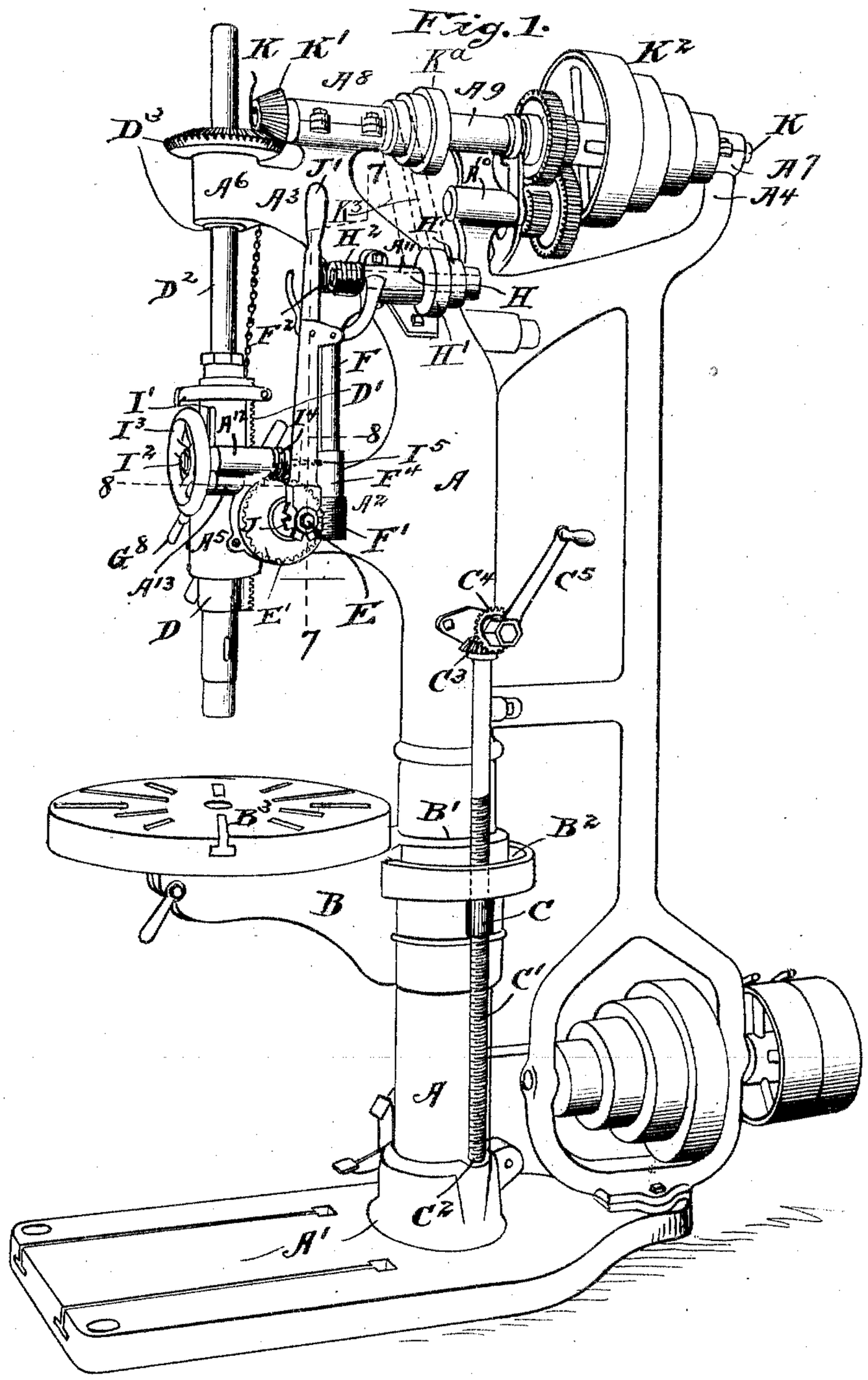
F. W., A. G. & E. A. HOEFER.

DRILLING MACHINE.

APPLICATION FILED FEB. 25, 1901.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.



Witnesses,
V. C. Mann,
S. N. Pond.

By

Inventors,
Frederick W. Hoefer
August G. Hoefer
Emil A. Hoefer
N. N. Morrison,
Atty.

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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2.

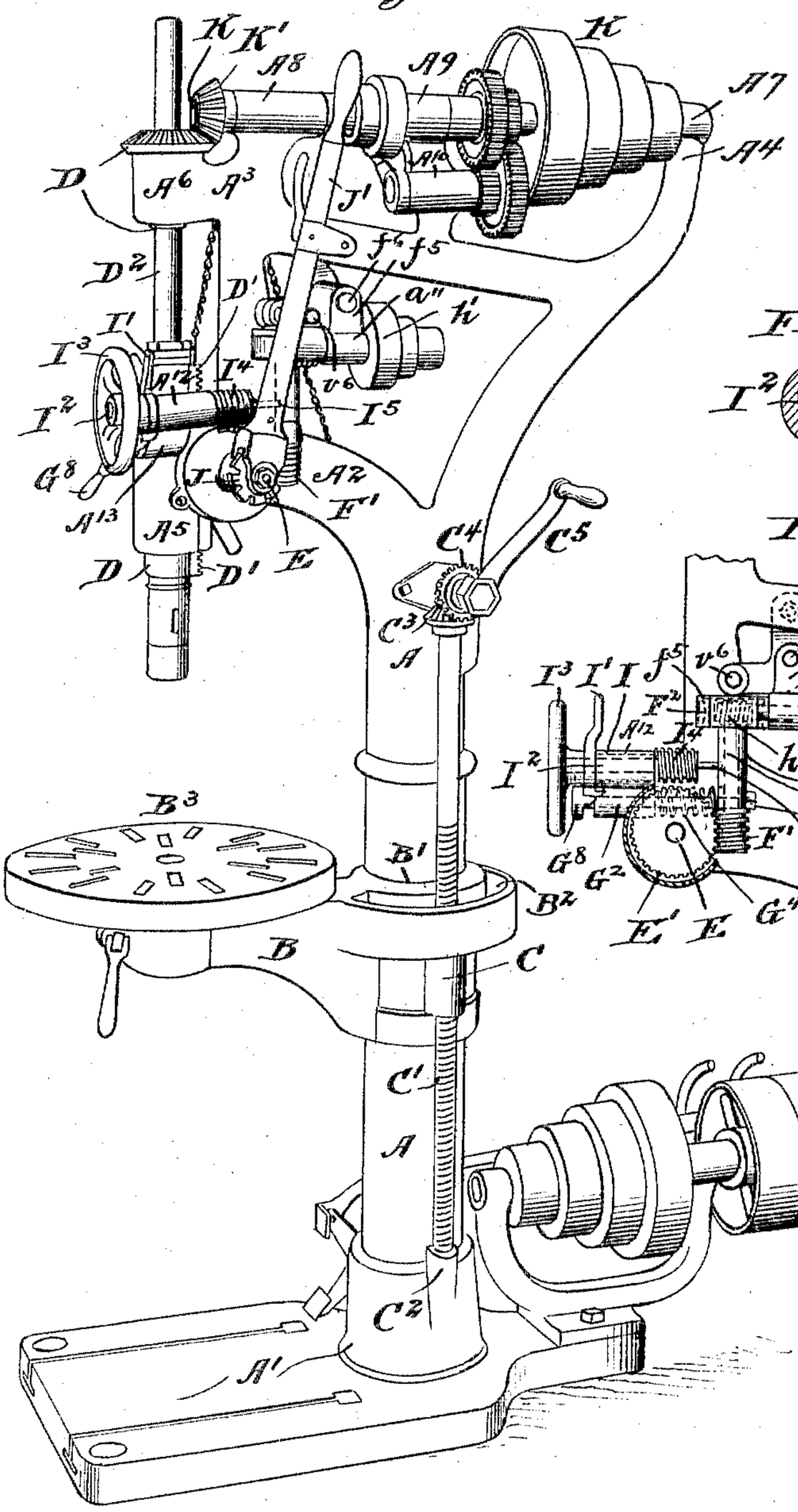

Fig. 13.

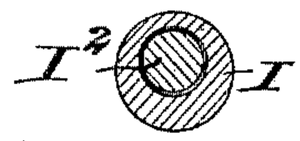

Fig. 11.

Witnesses,
F. G. Mann
S. N. Pond.

By

Inventors,
Frederick W. Hoefer
August G. Hoefer
Emil A. Hoefer
by W. N. Morrison,
Atty.

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NO MODEL. 4 SHEETS—SHEET 3.

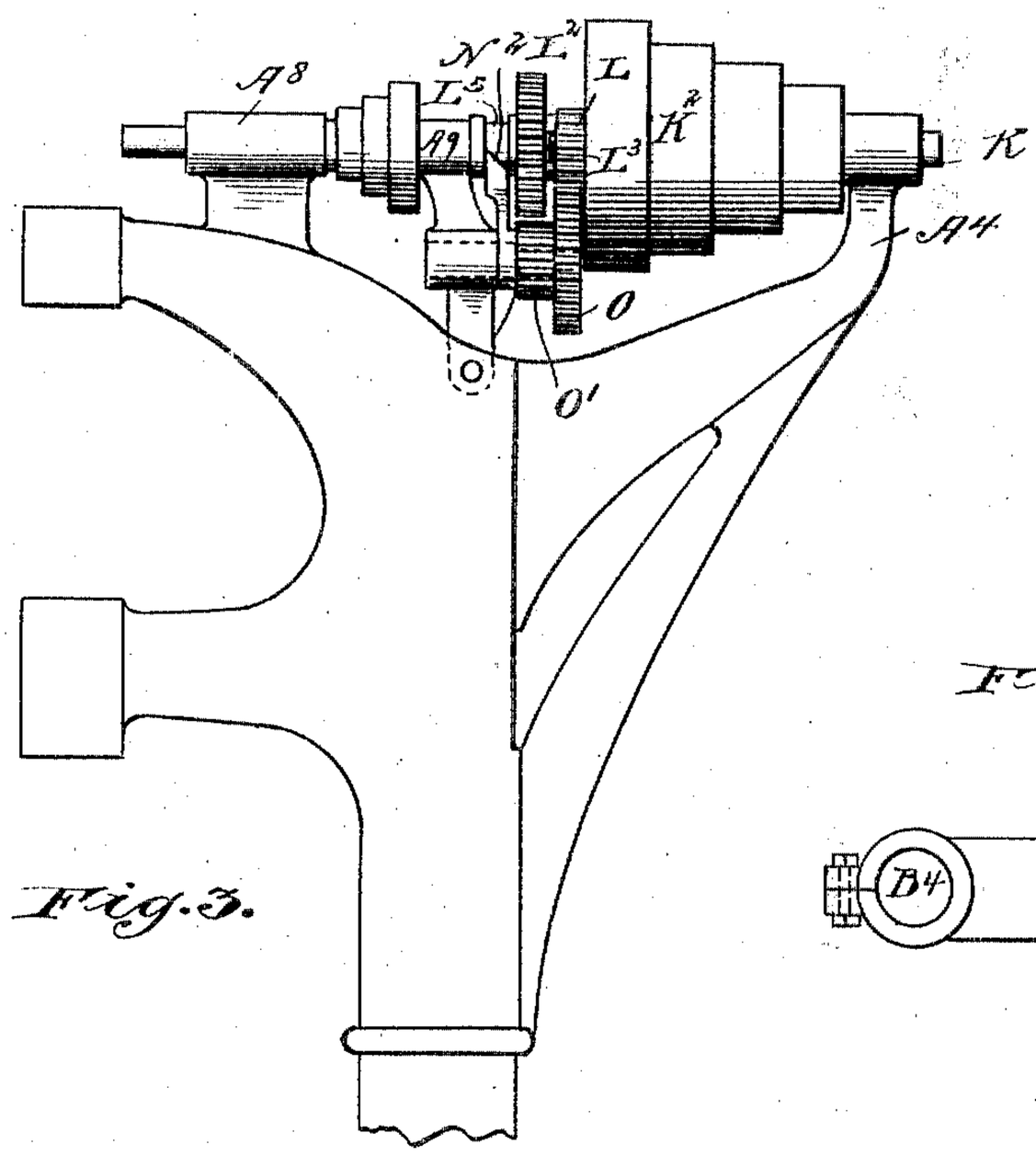
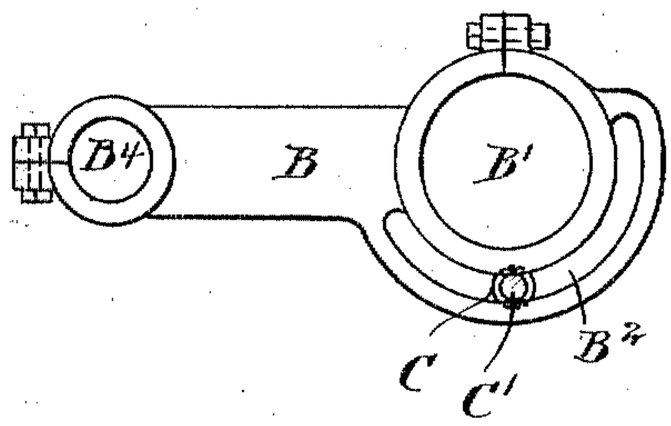


Fig. 3.

Fig. 10.



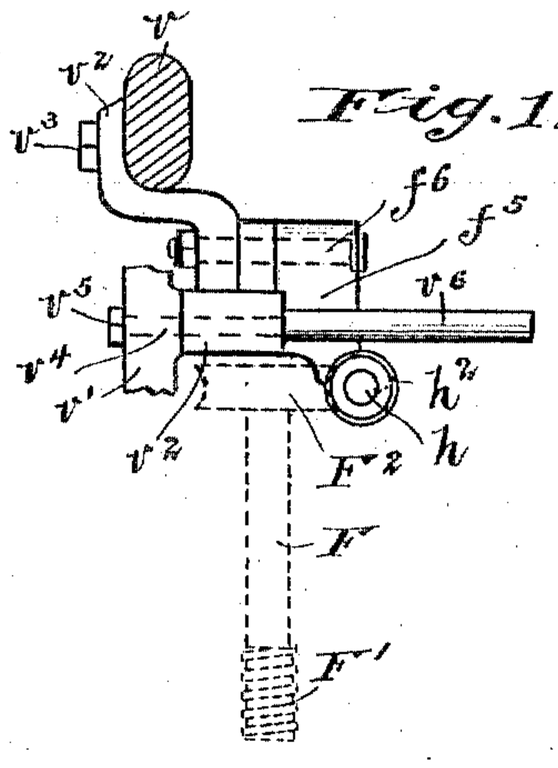


Fig. 12.

Witnesses.
F. S. Mann
S. N. Pond.

By

Inventors,
Frederick W. Hoefer
August G. Hoefer
Emil A. Hoefer
N. L. Morrison,
Atty.

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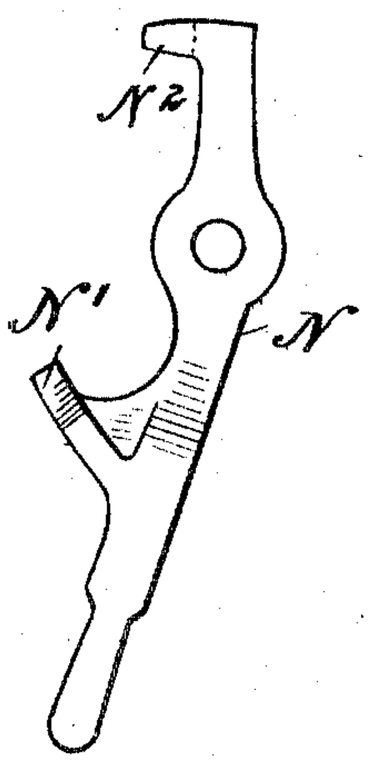
APPLICATION FILED FEB. 25, 1901.

NO MODEL. 4 SHEETS—SHEET 4.

Fig. 5.



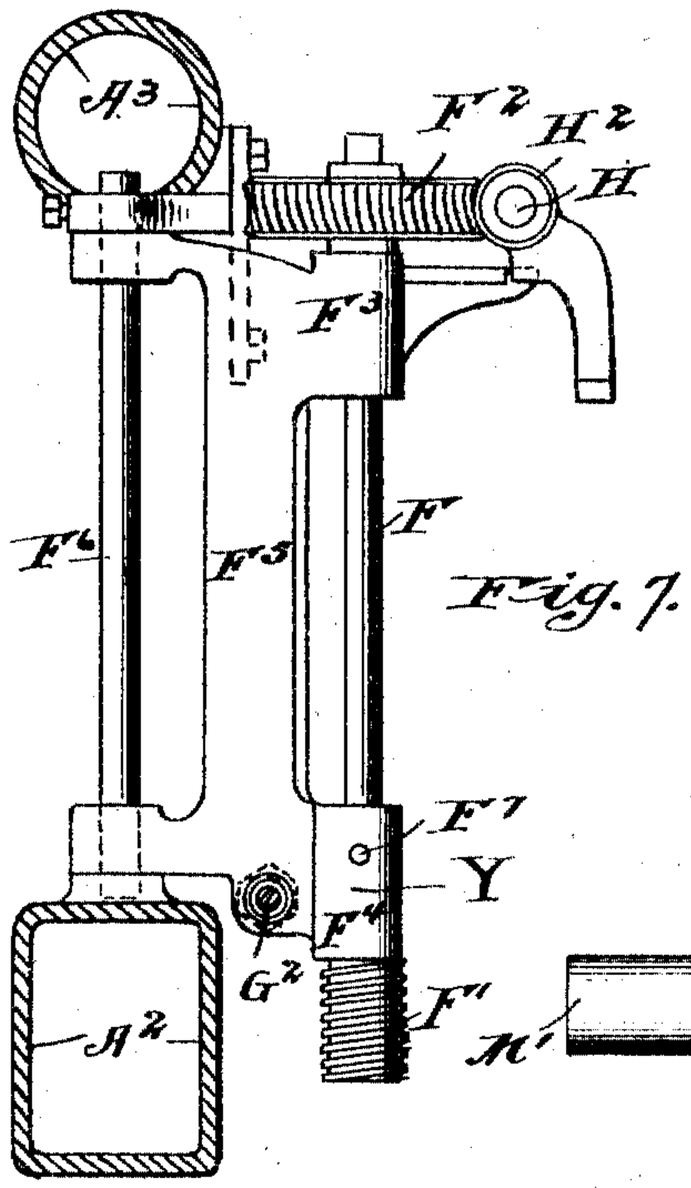


Fig. 7.

Fig. 6.

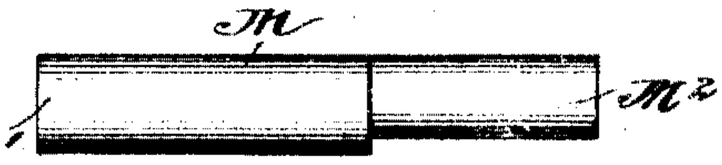


Fig. 8.

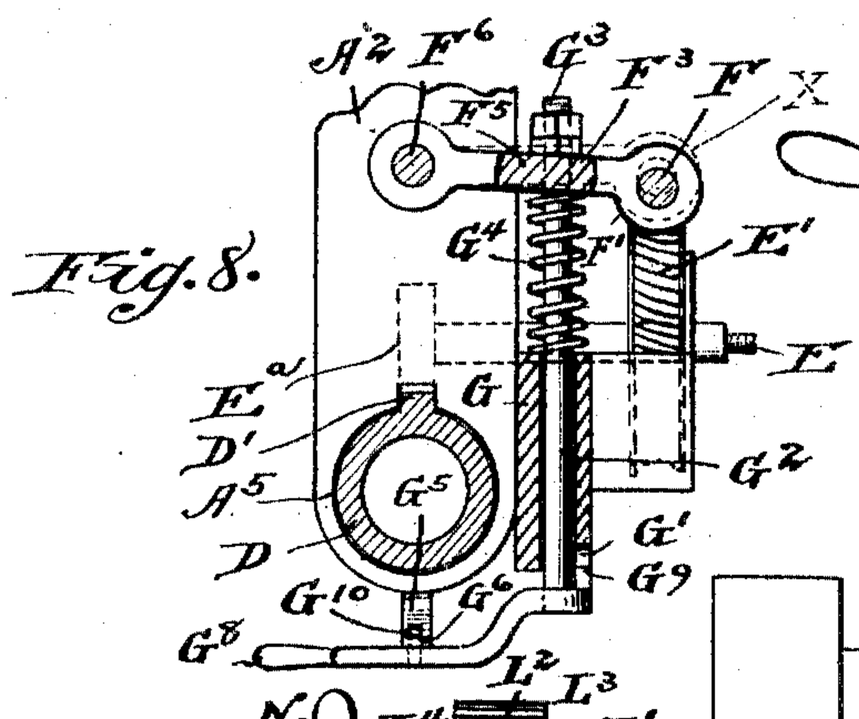


Fig. 9.

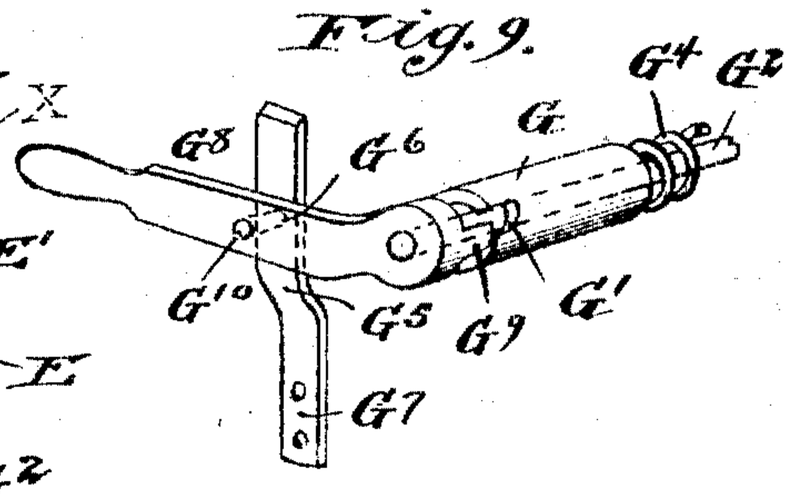
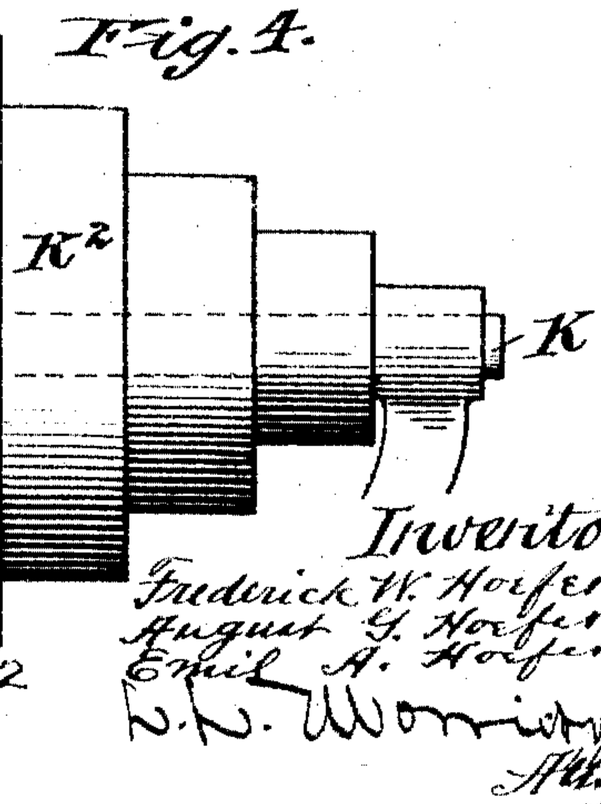


Fig. 4.



Witnesses,
F. D. Mann,
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Inventors,
Frederick W. Hoefer
August G. Hoefer
Emil A. Hoefer
by D. D. Morrison,
Atty.

No. 766,883. Patented August 9, 1904.

UNITED STATES PATENT OFFICE.

FREDERICK W. HOEFER, AUGUST G. HOEFER, AND EMIL A. HOEFER, OF FREEPORT, ILLINOIS, ASSIGNORS TO HOEFER MANUFACTURING COMPANY, OF FREEPORT, ILLINOIS, A CORPORATION OF ILLINOIS.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 766,883, dated August 9, 1904.

Application filed February 25, 1901. Serial No. 48,865. (No model.)

To all whom it may concern:

Be it known that we, FREDERICK W. HOEFER, AUGUST G. HOEFER, and EMIL A. HOEFER, citizens of the United States of America, residing at Freeport, in the county of Stephenson and State of Illinois, have invented certain new and useful Improvements in Drilling-Machines, of which the following is a specification.

Our invention relates to the class of drilling-machines commonly known as "power-drills;" and it consists of certain new and useful features of construction and combinations of parts hereinafter fully described, and specifically pointed out in the claims.

Referring to the accompanying drawings, which form a part of this specification, Figure 1 is an isometric view of a drill embodying our improvements. Fig. 2 is a like view of the same with slight modifications that will be fully pointed out hereinafter. Fig. 3 is a side elevation of the back gears of the drill, a clutch, and a cam-lever for operating the same. Fig. 4 is an enlarged detail view of the parts shown in Fig. 3. Fig. 5 is a side view of the cam-lever, an edge view whereof is clearly shown in Fig. 4. Fig. 6 is a detailed view of an eccentric shaft whereon the cam-lever shown in Fig. 5 and the two lower back gears of the drill are mounted. Fig. 7 is a section through the dotted line 7 7 in Fig. 1 and enlarged detail view of parts adjacent thereto. Fig. 8 is a section through the dotted line 8 8 in Fig. 1 and an enlarged detail view of parts adjacent thereto, other parts also being omitted. Fig. 9 is an isometric view of parts shown in Fig. 8 with other parts omitted. Fig. 10 is a top plan view of the platen-bracket of the drill. Fig. 11 is a side elevation of a portion of the drill shown in Fig. 2 with some parts broken away and others omitted. Fig. 12 is a detached fragmental detail view of parts shown in Fig. 11 with additional parts as seen when viewed at right angles thereto. Fig. 13 is a transverse section of an eccentric-sleeve bearing and a shaft mounted therein that will be fully described hereinafter.

Like letters of reference indicate corresponding parts throughout the several views.

A is the column of the drill-frame, which is supported by the base A' and provided with trifurcations A^2 A^3 A^4, having bearings A^5 A^6 A^7 A^8 A^9 A^{10} A^{11} A^{12} A^{13} therein and thereon for supporting parts to be described hereinafter.

B is a platen-bracket having a circular opening B' therein to adapt it to admit therethrough and to slide up and down on the column A and also provided with a semicircular slot B^2, extending vertically therethrough and concentric with such circular opening B'.

B^3 is a platen mounted on the platen-bracket B by means of a stud (not shown) projecting from the under side thereof into the circular opening B^4 in the free end of the platen-bracket B or in any other desired manner.

C is a platen-supporting nut projecting underneath both edges of the semicircular slot B^2 in the platen-bracket B.

C' is a platen-adjusting screw passing through and adapted to operate the platen-supporting nut C, having a vertical socket-bearing C^2 in the base A' of the drill and provided with any suitable means, as miter-gears C^3 C^4 and a crank C^5, for operating the same.

The employment of the semicircular slot B^2 in the platen-bracket B and the platen-supporting nut C, projecting below and beneath both edges of such circular slot B^2, so distributes the weight of the platen B^3 and its burden on said platen-supporting nut C that the latter travels vertically and does not bind upon or tend to kink the platen-adjusting screw C' when it is operated to raise or lower the platen.

D is a drill-spindle sleeve provided with the ordinary operating-rack D' and mounted in the vertical bearing A^5.

D^2 is a drill-spindle passing through the drill-spindle sleeve D and the bevel-gear D^3, rotating in and traveling vertically with the former, D, and sliding vertically through and rotating with the latter, D^3, by reason of spline connection therewith.

E is a horizontal shaft mounted in the part

A^2 and provided with a pinion E^*, fast thereto and meshing with the rack D' on the drill-spindle sleeve D.

E' is a worm-wheel fast to the shaft E.

F is a vertical shaft provided at its lower end with a worm F^* and at its upper end with a worm-wheel F^2, fast thereto and mounted in bearings F^3 F^4 in the swinging frame F^5, which is so mounted on the pintle F^6 that the worm F' can at will be swung thereby into and out of engagement with the worm-wheel E'.

F^7 is a worm-stop socket in the swing-frame which carries the shaft F.

G is a horizontal bearing in the part A^2 of the drill-frame, having a cam G' formed in one end thereof.

G^2 is the swinging-frame-controlling rod connected at one end G^3 somewhat loosely with the swinging frame F^5 and so mounted in the bearing G as to both slide endwise and rock therein.

G^4 is a spring normally holding the worm F', through the swinging frame F^5, out of engagement with the worm-wheel E'.

G^5 is an outwardly-bowed spring having a hole G^6 therein and fast by one end G^7 to the drill-frame.

G^8 is the swinging-frame-controlling rod cam-lever fast by one end to the outer end of such controlling-rod G^2, provided with a pull-out cam G^9, working against the counter-part cam G' and having a pin G^{10} projecting therefrom adapted to enter the hole G^6 in the spring G^5 and lock the same in the position shown in Figs. 8 and 9.

H is a shaft mounted in the bearing A^{11} and provided with a cone driving-pulley H'.

H^2 is a worm on the shaft H, constantly meshing with the worm-wheel F^2.

I, Fig. 13, is an eccentric rock-sleeve mounted in the bearing A^{12} and provided with a rocking lever I', integral or rigidly connected therewith.

I^2 is a shaft mounted in the eccentric sleeve I and provided with a hand-wheel I^3, fast thereto.

I^4 is a worm on the shaft I^2, adapted to be thrown into and out of engagement with the worm-wheel E' by rocking the eccentric sleeve I back and forth by means of the lever I'.

I^5 is a worm-stop which holds the worm F' out of engagement with the worm-wheel E' while the worm I^4 is in engagement therewith, and vice versa.

J is a ratchet fast to the shaft E.

J' is a drill-spindle feed-lever, so mounted on the shaft E as to freely turn thereon and provided with a pawl (not shown) adapted to engage with and be disengaged from the ratchet J.

K is the drill-spindle driving-shaft, mounted in the bearings A^7 A^8 A^9, having a cone-pulley K^* and bevel-gear K' fast thereto the latter meshing with the bevel-gear D^3 and provided with a cone-pulley K^2, mounted loose thereon.

K^3, Fig. 1, is a belt connecting the cone-pulleys H' K^*.

Integral L L' are a pinion and the female member of a clutch fast to the cone-pulley K^2 and mounted loose on the shaft K.

Integral L^2 L^3 are a gear and the male member of a clutch splined to the shaft K, so as to travel therewith and freely slide thereon. The gear L^2 is also provided with a hub L^4 integral therewith, having a transverse annular groove L^5 in the periphery thereof.

M is an eccentric rock-shaft, the part M' being of greater diameter than the part M^2 thereof, mounted in the bearing A^{10}.

N is a cam-lever mounted on and fast to the part M' of the rock-shaft M and provided with two oppositely-inclined cam-lugs N' N^2, adapted to alternately engage with the annular groove L^5 in the hub L' and therethrough throw the gear L^2 into or out of engagement with the pinion L.

O O' are a concentric gear and pinion integral or rigidly connected and rotatably mounted on the part M^2 of the rock-shaft M, so as to be thrown into and out of engagement with the pinion and gear L L^2 by rocking the shaft M by means of the lever N.

The swinging frame F^5 and some parts connected therewith (shown in detail in Fig. 7) are shown in slightly-modified form in Figs. 2, 11, and 12, (which see,) and in order to avoid confusion in describing the same small letters of the alphabet have been employed in referring thereto.

e e', Fig. 12, are two fragments of the drill-frame, (shown in Fig. 2,) having a supporting-bracket e^2 secured thereto by means of a cap-screw e^3, a bolt e^4, and nut e^5, the bolt e^4 being extended to form a rest e^6 for the drill-spindle lever J'.

f^5 is a swinging frame having bearings a^{11} f^3 therein and mounted on a stud or pintle f^4, projecting horizontally from the drill-frame.

h is a shaft mounted in the bearing a^{11} and provided with a cone driving-pulley *h'*.

h^2 is a worm on the shaft *h*, constantly meshing with the worm-wheel F^2.

The drill-spindle D^2 may be operated in the usual manner by means of the feed-lever J'. The worms F' I^4, Figs. 1 and 2, are both out of mesh with the worm-wheel E', which is fast to the shaft E, which carries the pinion E^*, that operates the drill-spindle D^2 through its rack D'. If it is desired to feed a drill, by means of the spindle D^2, uniformly and automatically downward, the operator will raise the lever G^8 from the position shown in Figs. 1 and 2 to that shown in Figs. 8 and 9. The change of position of such lever acting, by reason of the joint operation of the cams G' G^9, upon and through the rod G^2 and against the spring G^4 will swing the frame F^5 from

the position indicated by dotted lines X, Fig. 8, to the position there shown in solid lines, thereby bringing the worm F′ into mesh with the worm-wheel E′ and the free end of the stop I^5 into engagement with the socket F^7, which conjointly prevent the worm I^4 from engaging with the worm-wheel E′ so long as the worm F′ is in engagement therewith, thus preventing breakage that would result from both worms being in engagement with the worm-wheel E′ at the same time. Should it be desired to feed the drill-spindle D^2 downward by means of the hand-wheel I^3, the worm F′ must be returned to the position shown in Figs. 1 and 2 and the lever I′ turned downward, thereby turning the thin part of the eccentric rock-sleeve I downward until the worm I^4 is in engagement with the worm-wheel E′. The free end of the stop I^5 will then rest against or in close proximity to the point Y, Fig. 7, on the swinging frame below the socket F^7 therein, thereby preventing the worm F′ from engaging with the worm-wheel E′ so long as the worm I^4 is engaged therewith. With the pinion L in engagement through the clutch $L' L^3$ with the gear L^2 and both out of mesh with the gear O and pinion O′, all as in Fig. 3, obviously the full speed of the shaft K would be communicated to the drill-spindle D^2 at the expense of power. Should power be desired at the expense of speed, turn the cam-lever N to the position shown in Fig. 4. Such movement of the cam-lever N will cause the cam-lug N^2 to disengage from and the cam-lug N′ to engage with the groove L^5 in the hub L^4 and therethrough disengage the part L^3 of the clutch from the part L′ thereof and will also cause the lower gear and pinion to engage, respectively, with the upper pinion and gear through the rocking of the cam-shaft M from the position shown in Fig. 3 to that shown in Fig. 4, thereby reducing the speed of the shaft K and drill-spindle D^2 four times to gain power at the expense of speed.

We claim as new and desire to secure by Letters Patent—

1. In a drilling-machine, in combination, a column and its supporting-base, a platen-bracket, having a circular opening therein—to adapt it to admit therethrough, and to slide up and down, the column—and provided with a semicircular slot extending vertically therethrough and concentric with the circular opening in the platen-bracket, a platen-supporting nut, projecting underneath both edges of the semicircular slot in the platen-bracket and a platen-adjusting screw, passing through and adapted to operate the platen-supporting nut and having a bearing in the drill-base, substantially as and for the purpose specified.

2. In a drilling-machine, in combination, a drill-frame, a drill-spindle sleeve, carrying a spindle and provided with an operating-rack and mounted in a vertical bearing in the drill-frame, a horizontal shaft E, provided with a pinion E^a fast thereto and meshing with the rack on the drill-spindle sleeve, a worm-wheel E′ fast to the horizontal shaft E, a vertical shaft F, provided, at its lower end, with a worm F′ and, at its upper end, with a worm-wheel F^2, a frame—having a worm-stop socket therein—carrying the vertical shaft F and so mounted, on the drill-frame, that the worm F′ thereon can, at will, be thereby swung into, and out of, engagement with the worm-wheel E′ on the horizontal shaft E, an eccentric rock-sleeve mounted in a horizontal bearing in the drill-frame, a shaft I^2 mounted in the rock-sleeve, a worm I^4 fast to the shaft I^2 and adapted to be thrown into, and out of, engagement with the worm-wheel E′, on the horizontal shaft E, by rocking the eccentric sleeve back and forth, and a stop I^5—projecting from the free end of the worm I^4—for holding the worm F′ out of engagement with the worm-wheel E′, while the worm-wheel I^4 is in engagement therewith, and vice versa, substantially as and for the purpose specified.

3. In a drilling-machine, in combination, a drill-frame, a drill-spindle driving-shaft K mounted therein, a cone-pulley K^2 loose on the shaft K, an integral pinion L and female member L′ of a clutch fast to the cone-pulley K^2 and mounted loose on the driving-shaft K, an integral gear L^2 and male member L^3 of a clutch—splined to the driving-shaft K so as to travel therewith and freely slide thereon—provided with a hub L^4 having a transverse annular groove L^5 in the periphery thereof, an eccentric rock-shaft M—a part M′ thereof being of greater diameter than the part M^2—mounted, by the part M′, in the drill-frame, a concentric gear and pinion O O′, integral or rigidly connected, mounted on the part M^2 of the shaft M, a cam-lever N, mounted on and fast to the part M′ of the rock-shaft M and provided with oppositely-inclined lugs N′ N^2, adapted to alternately engage the annular groove L, in the hub L^4, and therethrough throw the gear L^2 into and out of engagement with the pinion L, and, through the eccentric shaft M, throw the gear and pinion O O′ into and out of engagement with the pinion and gear L L^2, substantially as and for the purpose specified.

4. In a drilling-machine, in combination, a drill-frame, a swinging frame mounted thereon, a horizontal bearing G in the drill-frame having a cam G′ formed in one end thereof, a rod G^2, connected, at one end, somewhat loosely, to the swinging frame, and so mounted, in the bearing G, as to slide—endwise—and rock therein, a spring normally holding the swinging frame away from the bearing G, an outwardly-bowed spring G^5, fast by its lower end to the drill-frame and having a hole G^6 therein, a swinging-frame-controlling rod

cam-lever G^8—fast, by one end, to the outer end of the rod G^2—provided with a pull-out cam G^9, working against the cam G' on the bearing G, and having a locking-pin projecting therefrom adapted to enter the hole G^6 in the spring G, substantially as and for the purpose specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

FREDERICK W. HOEFER.
AUGUST G. HOEFER.
EMIL A. HOEFER.

Witnesses:
CORA E. HOEFER,
D. B. BREED.