(No Model.) 3 Sheets—Sheet 1.

F. B. MILES.

DRILLING MACHINE.

No. 430,082. Patented June 10, 1890.

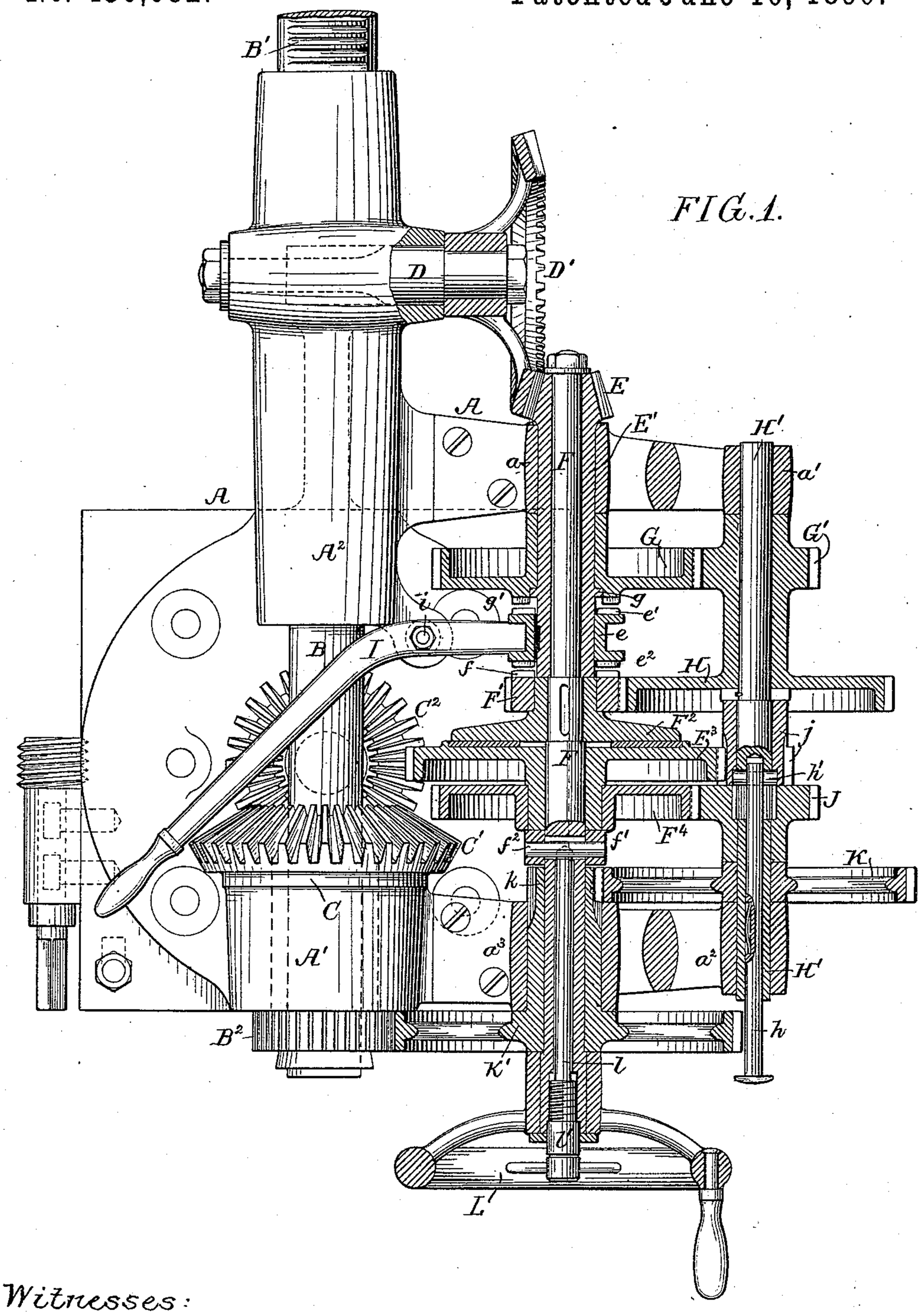

FIG. 1.

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by his Attorneys
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(No Model.) 3 Sheets—Sheet 2.

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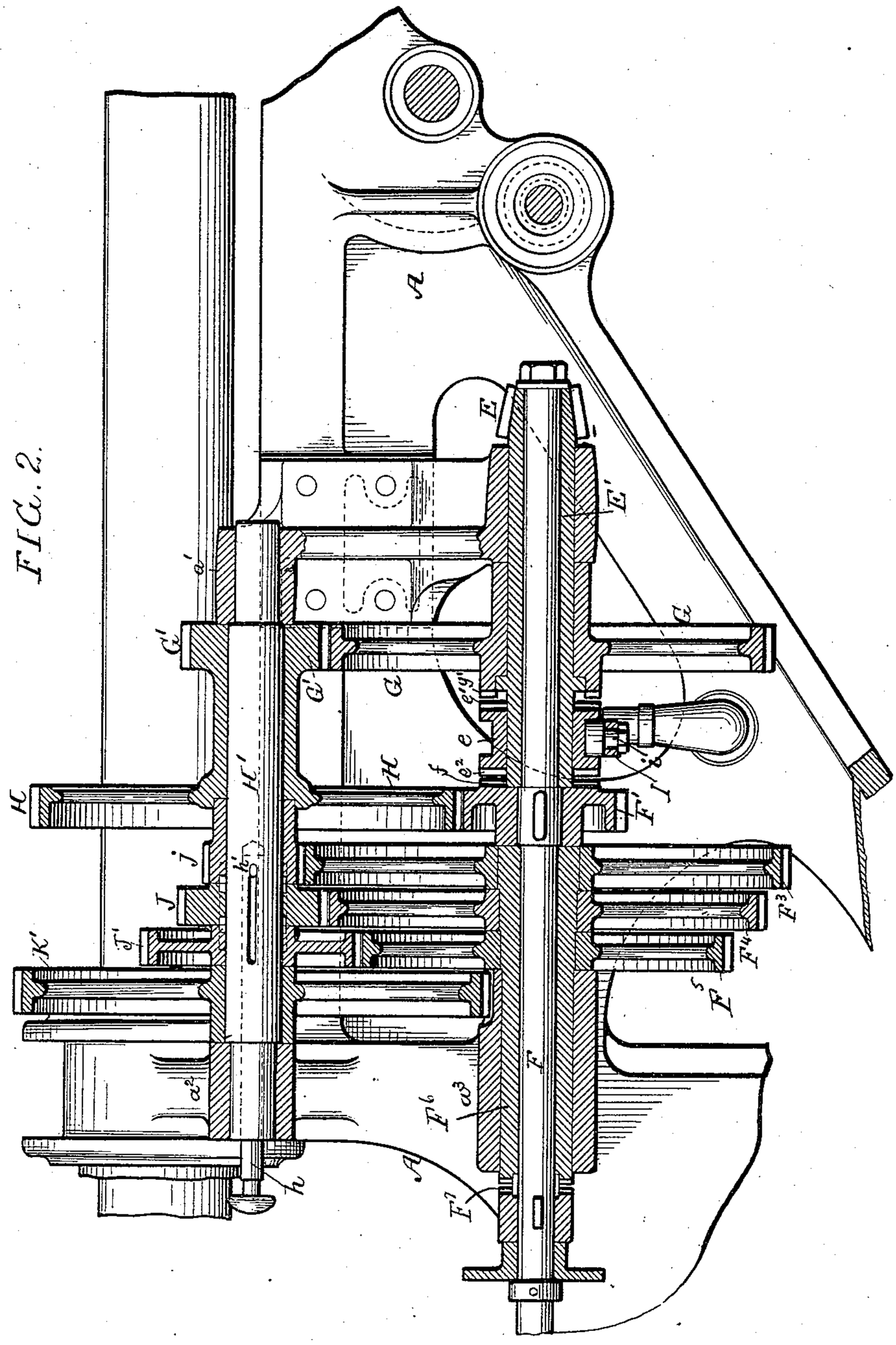
No. 430,082. Patented June 10, 1890.

FIG. 2.



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(No Model.) 3 Sheets—Sheet 3.

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DRILLING MACHINE.

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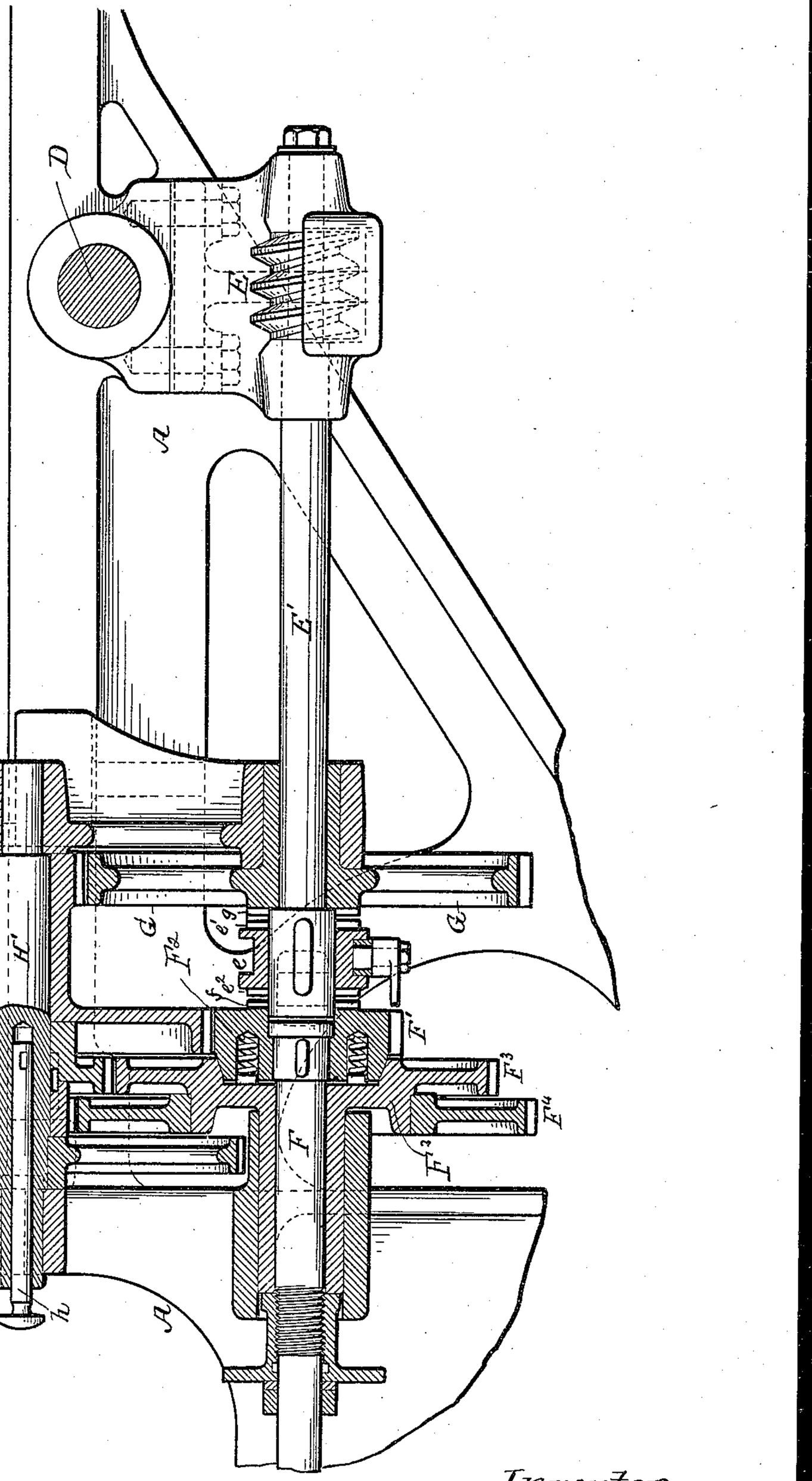
FIG. 3



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UNITED STATES PATENT OFFICE.

FREDERICK B. MILES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HIMSELF, CLARENCE S. BEMENT, WM. P. BEMENT, AND FRANK BEMENT, ALL OF SAME PLACE.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 430,082, dated June 10, 1890.

Application filed January 7, 1889. Serial No. 295,629. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK B. MILES, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Drilling-Machines, of which the following is a specification.

My invention relates to certain improvements in drilling and boring machines, both vertical and horizontal, the object of my invention being to provide means for increasing or diminishing the feed of the drill-spindle, as fully described hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 is a face view, partly in section, of sufficient of a vertical drilling-machine to illustrate my invention. Fig. 2 is a sectional view of a portion of a horizontal drilling-machine, showing a modification of my invention. Fig. 3 is a sectional view of another form of horizontal drilling-machine, also showing a modification of my invention.

Referring in the first instance to Fig. 1, A is the supporting-frame of the drill-spindle and the feed-shafts. B is the drill-spindle. C is a sleeve mounted in the frame A and having a bevel gear-wheel C′, which meshes with a bevel-wheel C^2 on the driving-shaft. The drill-spindle B passes through the sleeve C and can slide therein, but must turn with the sleeve, rotary motion being imparted to the spindle from the driving-shaft through the sleeve and gears above described.

The vertical feed of the spindle is imparted to it from the sleeve C through a train of change-gears, described hereinafter, the speed of which can be varied, and it is to the construction of this mechanism that my invention relates.

The sleeve C is adapted to the bearing A′, and the spindle B is adapted to a bearing A^2, both secured to or forming part of the supporting-frame A.

To the upper portion of the spindle B is attached the rack B′, having teeth which engage with a pinion cut, in the present instance, from a solid shaft D. (Shown by dotted lines.)

On the outer end of the shaft D is secured a bevel-wheel D′, which meshes with a bevel-pinion E on the hollow shaft or sleeve E′. The sleeve is journaled in a bearing *a* on the frame A. Passing through the sleeve is a vertical shaft F, to which is secured a friction-disk F^2, described hereinafter.

On the lower end of the sleeve E′ is a gear-wheel G, which is supported by a collar *g* on the sleeve E′. This gear-wheel is loose on the sleeve. On the hub of this gear-wheel are clutch-teeth *g*′, and adapted to slide on but turn with the sleeve E′ is a clutch *e*, having teeth *e*′ and e^2 on its two faces. The teeth *e*′ are adapted to engage with the teeth *g*′ on the hub of the gear-wheel G, and the teeth e^2 to engage with teeth *f* on the upper surface of a pinion F′, secured to the hub of the friction-disk F^2.

A hand-lever I, pivoted at *i* to the frame of the machine, has a pin which rests in the groove of the clutch *e*, so that by moving the hand-lever the clutch can engage either the gear-wheel G or the pinion F′, depending upon whether fast or slow speed is required.

Journaled in bearings *a*′ a^2 on the frame A is a vertical shaft H′, parallel with the shaft F. Loose on this shaft is a gear-wheel H, which meshes with the pinion F′. On the extended hub of this gear-wheel is a pinion G′, meshing with the gear-wheel G.

Loose on the vertical shaft F is a friction-disk F^3, which can be thrown into and out of gear with the friction-disk F^2. On the periphery of the friction-disk F^3 are teeth which engage with the teeth on a pinion *j*, loose on the hollow shaft H. On the hub of the disk F^3 is secured a gear-wheel F^4, which meshes with a pinion J, loose on the hollow shaft H′. Secured to the shaft H′ is a gear-wheel K, which meshes with a pinion *k*, cut in the hub of the gear-wheel K′, which has its bearing in the box a^3. The shaft F passes through the hub of the gear-wheel K′, and secured to the lower end of this shaft is a hand-wheel L, by which the driving-spindle can be raised and lowered by hand.

In the lower portion of the hollow shaft H′

is a rod h, which has a cross-pin h', adapted to slide vertically in the shaft and to engage with either the pinion j or pinion J, depending upon the speed at which the shaft F is required to be driven. In Fig. 1 I have shown the pin h in contact with the pinion j.

To throw the friction-disk F^3 in contact with the disk F^2, I provide a sliding collar f' on the shaft F, having a pin f^2, which passes through an orifice in the shaft, and against which bears a vertical rod l, passing longitudinally through the shaft F. This rod rests in a handled nut l'. By turning this nut the friction-disk can be raised or lowered. Thus it will be seen that by regulating the feeding mechanism of the machine different rates of speed can be attained, and all that is necessary to quickly change the feed of the spindle from fast to slow is the manipulation of the hand-lever I, which throws the clutch into engagement with the gear-wheel G, decreasing the speed, while if the clutch e is in direct contact with the pinion F' the bevel-pinion E will be in direct communication with said pinion F' and a quick speed attained. Thus it will be seen that when the clutch e is in the position shown in Fig. 1, midway between the two faces, the feed of the drill-spindle is stopped; but if the clutch is thrown into engagement with the teeth on the pinion G the movement of the several parts will be as follows: Rotary motion being imparted to the sleeve C through the medium of the bevel-gears from the driving-shaft, this rotary motion is then imparted to the gear-wheel K' through the medium of the gear-wheel B^2, secured to the sleeve C. The rotary motion is then imparted to the shaft H' through the pinion k and gear-wheel K. If the cross-pin h' is in the position shown, motion will be imparted to the pinion j, from thence to the lower friction-disk F^3, and if the two disks are in contact motion will be imparted to the upper disk F^2, pinion F', gear-wheel H, pinion G', gear-wheel G, through the clutch-sleeve E', pinion E, gear-wheel D', and pinion-shaft D, the latter engaging with the rack B' to move the spindle B in a vertical line.

If the clutch e thrown in gear with the pinion F', motion will be imparted to the sleeve E' and its pinion E direct. The speed can also be slightly varied by lowering the pin h' so as to engage with the pinion J, which meshes with the gear-wheel F^4 less in diameter than the toothed friction-disk F^3.

When the hand-wheel L is used to turn the shaft F, the gearing between the gear-wheel B^2 and friction-disk F^2 will be out of action, and motion can either be applied directly to the clutch e or indirectly to the clutch through the medium of the gears F', H, G' and G, depending upon the position in which the clutch is placed.

In Fig. 2 I have shown a horizontal drilling-machine to which my invention is applied. In this instance the friction-disks have been dispensed with, and in place of the two pinions j and J, which mesh with gear-wheels F^3 and F^4, three sets of pinions and three sets of gear-wheels are used, the bar h in the shaft H' meshing with one or other of the pinions. Motion is imparted to the shaft H' through the gear-wheel K' to one or other of the pinions above alluded to, and to one of the gear-wheels which are mounted on a sleeve F^6, which can be thrown into gear with the shaft F through a clutch F^7, and if the clutch e is moved into contact with the pinion F' the sleeve E' and its pinion E will be acted upon direct; but if the clutch e is thrown into gear with the teeth on the gear-wheel G motion will be imparted to the sleeve through the gear-wheel H, pinion G', and gear-wheel G. Different speeds can be attained by moving the pin h' into engagement with either of the pinions j, J, or J'.

In Fig. 3 I have shown a modification in which a shaft E' is substituted for the sleeve E' in Fig. 1, and in place of the pinion E a worm is mounted on the shaft E', which meshes with a worm-wheel on the shaft D, and in place of the wide friction-disks shown in Fig. 1 a conical friction-clutch is shown. Otherwise the general arrangement of parts is identical with that shown in Fig. 1, the machine shown in Fig. 3 being intended for horizontal boring or drilling.

I claim as my invention—

1. A combination, in a drilling or boring machine, of the drill-spindle, a feed-shaft E', mechanism connecting the spindle and shaft, a clutch e on the shaft clutching faces thereon, with gear-wheels G and H, and pinions G' and F', the said pinion F' and wheel G having clutch-faces with which the clutch can engage, and mechanism for driving the pinion F' and wheel G, substantially as described.

2. The combination, in a drilling or boring machine, of the drill-spindle and a driven disk F^2, having a pinion F' with clutch-teeth on its face, a wheel G, having clutch-teeth on its hub, and a movable clutch e, having teeth on both its faces, a lever or other device for moving said clutch into gear with the wheel G or with the pinion F', and a wheel H, meshing with the pinion F', and having upon its hub the pinion G', which meshes with a wheel G, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERICK B. MILES.

Witnesses:
HENRY HOWSON,
WILLIAM D. CONNER.