(No Model.) 2 Sheets—Sheet 1.

B. G. LUTHER.

DRILLING MACHINE.

No. 438,014. Patented Oct. 7, 1890.

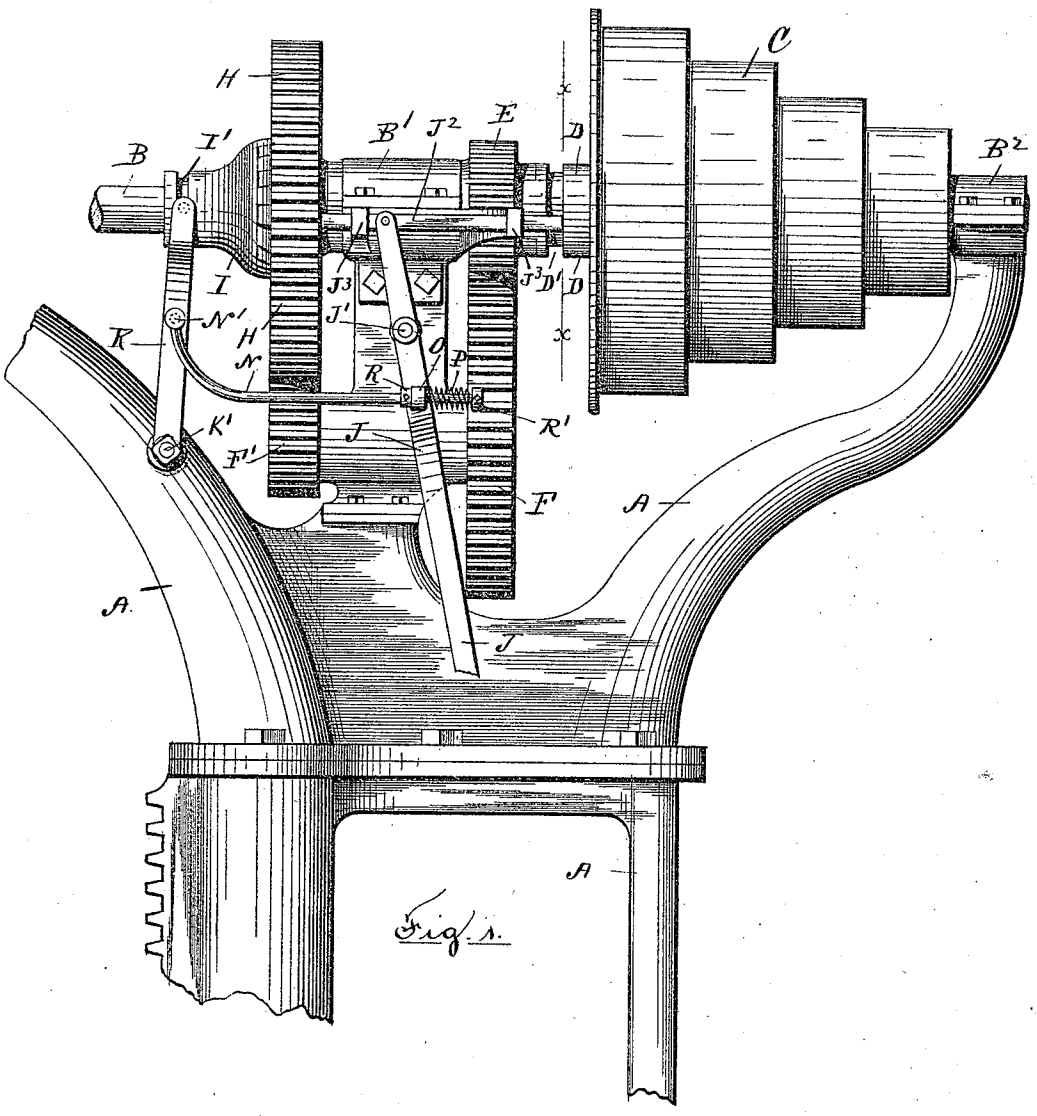

Fig. 1.

Witnesses
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Rufus B. Fowler

Inventor
Benjamin G. Luther.

(No Model.) 2 Sheets—Sheet 2.

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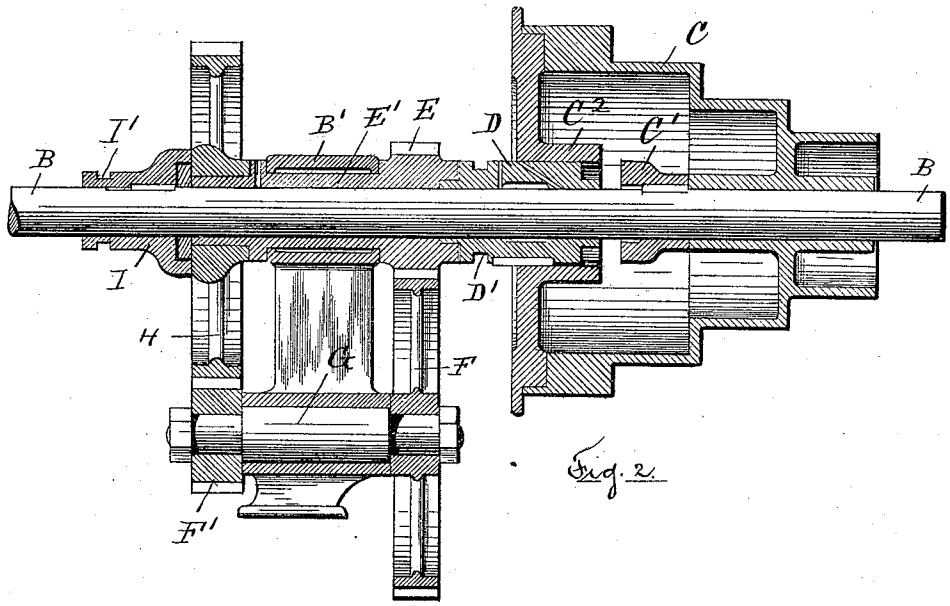

Fig. 2.

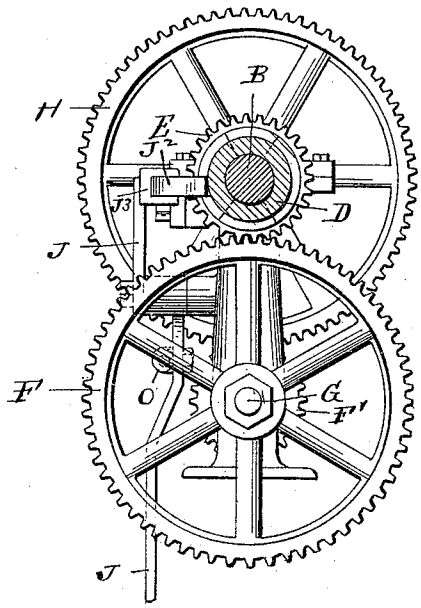

Fig. 3.

Witnesses
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UNITED STATES PATENT OFFICE.

BENJAMIN G. LUTHER, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO ALBERT F. PRENTICE AND VERNON F. PRENTICE, OF SAME PLACE.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 438,014, dated October 7, 1890.

Application filed July 21, 1890. Serial No. 359,426. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN G. LUTHER, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Drilling-Machines, of which the following is a specification, reference being had to the accompanying drawings, representing such portions of a drilling-machine as embody my invention, and in which—

Figure 1 represents, in side elevation, the upper portion of the post, showing the driving cone-pulley and the system of gearing known as the "back gears," through which the power is transmitted to the drill-spindle when a slower motion, and corresponding greater power, is required. The method of transmitting rotary motion to the drill-spindle of a drilling-machine either directly from the driving cone-pulley or through the intervention of what are known as "back gears," is too well known to require detailed illustration or description.

My present invention relates to the mechanism by which the drill-spindle is connected or disconnected with the cone-pulley or through the intervention of the back gears, as the exigencies of the work may require; and it consists in the construction and arrangement of the clutching mechanism by which the cone-pulley and back gears are alternately engaged or disengaged, as hereinafter described, and set forth in the subjoined claims.

Fig. 2 of the drawings represents the upper horizontal shaft of the drilling-machine, with the cone-pulley, back gears, and clutching mechanism embodying my invention shown in sectional view; and Fig. 3 is a sectional view of the same on line X X, Fig. 1.

Similar letters refer to similar parts in the different figures.

A denotes a portion of the frame-work of the drilling-machine, and B denotes the upper horizontal driving-shaft connected in the usual and well-known manner with the drill-spindle of the machine, so that the rotation of the shaft B will be communicated to the drill-spindle.

The shaft B is journaled in bearings B′ B^2 in the frame-work of the machine, and turning loosely upon the shaft B is a cone-pulley C, to which rotary motion is imparted in the usual manner from a counter-shaft.

Inclosed within the cone-pulley C and attached to the shaft B, is the toothed collar C′, forming the half of toothed clutch.

C^2 denotes a hub upon the cone-pulley C, within which is placed the sliding sleeve D, turning with the cone-pulley upon the shaft B and having a spline-connection with the hub C^2 of the cone-pulley.

The sleeve D is provided with an annular groove D′, forming a neck to receive the shipper, and with teeth adapted to engage the toothed collar C′, forming the other half of the clutch by which the rotary motion of the cone-pulley is imparted directly to the shaft B.

E denotes a pinion provided with a long hub or sleeve E′, which extends through the bearing B′. The opposing ends of the pinion E and sliding sleeve D are provided with clutch-teeth, so that the rotary motion of the cone-pulley is imparted to the pinion E, which turns loosely upon the shaft B. The pinion E engages a spur gear-wheel F, attached to a short horizontal shaft G, journaled in a bearing in the frame of the machine.

F′ is a pinion attached to the opposite end of the shaft G, engaging a spur gear-wheel H, turning loosely upon the end of the hub or sleeve E′.

I denotes a sliding collar having a spline-connection with the shaft B and provided with clutch-teeth adapted to engage similar clutch-teeth upon the side of and integral with the spur gear-wheel H, so that the rotary motion received from the cone-pulley C through the train of gearing described is imparted to the shaft B. The collar I has an annular groove I′ to receive the shipper, and the sliding collars I and D are moved simultaneously in opposite directions by means of the shipping mechanism consisting of the lever-handle J, pivoted upon a fixed stud J′ and pivoted at its end to the sliding bar J^2, which slides in ways J^3 J^3 and engages the sleeve D. The movement of the lever-han-

dle J is also made to slide the clutch-collar I through the lever K, pivoted to the frame at K′ and engaging at its free end with the collar I. The lever K is connected with the lever-handle J by means of the connecting-rod N, which is pivoted to the lever K at N′ and having its opposite end held in an eyebolt O, which turns or is swiveled in the lever J.

The rod N is capable of a slight sliding movement through the eyebolt O against the tension of the spiral spring P.

Collars R R′ are attached to the rod N, and a spiral spring P is placed between the eyebolt O and the collar R′.

The operation of the clutching mechanism is as follows: The movement of the lever-handle J to the right carries the sliding collar D to the left, bringing its clutch-teeth into engagement with the clutch-teeth upon the hub of the pinion E and causing the rotary motion of the revolving cone-pulley to be imparted to the pinion E and through the intermediate gearing F and F′ to the gear H. As the lever-handle is moved to the right the lever K is moved to the right by means of the connecting-rod N, carrying the collar I into engagement with the gear H and causing the rotary motion of the gear to be imparted to the shaft B. The reverse motion of the lever-handle J carries the sliding sleeve D toward the right and into engagement with the toothed collar C′, attached to the shaft B, so that the rotary motion of the cone-pulley is imparted directly to the shaft, and at the same time the collar I is moved toward the left and out of engagement with the gear H. The motion of the cone-pulley is thus imparted to the shaft B either directly, by means of its engagement with the clutch-teeth upon the collar C′ and the sleeve D, or indirectly, through the clutch-teeth upon the sliding collar I and the gear-wheel H and intermediate train of gearing.

The space between the clutch-teeth upon the pinion E and the clutch-teeth upon the collar C′ is somewhat greater than the entire length of the sliding sleeve D, in order to allow the sleeve to be held midway the collar C′ and pinion E and out of engagement with each, so that the motion of the cone-pulley will not be imparted to the shaft B.

When the lever-handle is moved toward the left and the cone-pulley engaged with the shaft through the collar C′, the back gears are at rest, and as the lever J is moved in the opposite direction or toward the right the back gears are engaged by the cone-pulley and a rotary motion imparted to them through the sliding sleeve and the clutch-teeth upon the side of the pinion E, and as the sliding sleeve D has an independent rotation relatively to the sliding collar I it is necessary to allow an independent sliding motion to the sleeve D and collar I in case the clutch-teeth upon the collar I should not correspond with and engage the teeth upon the gear-wheel H, as the teeth upon the sliding sleeve are made to engage the teeth upon the side of the pinion, and this independence of movement is permitted by means of the spring P, which yields to compression in case the teeth of the collar I do not engage the teeth of the gear H, and as the gear H is rotated the clutch-teeth upon its side are moved into correspondence with the teeth upon the collar I, when the tension of the spring will actuate the lever K and carry the collar I into engagement with the gear H, thereby connecting the cone-pulley with the shaft B.

In the construction represented in the accompanying drawings the yielding connection is interposed between the connecting-rod N and the lever-handle J; but it will be obvious that it might be placed between the lever K and the collar I, or at any desired point, by a construction which will readily suggest itself.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the driving-shaft of a drilling-machine, of a driving-pulley running loosely on said shaft, a collar inclosed within said pulley and attached to said shaft, said collar being provided with teeth forming half of a clutch, and a sliding sleeve sliding concentrically with said shaft and having a spline-connection with said driving-pulley, said sleeve being provided with teeth adapted to engage the teeth on said fixed collar, whereby the rotary motion of the pulley is imparted to the shaft, substantially as described.

2. The combination, with the driving-shaft of a drilling-machine, of a pulley running loosely on said shaft, a clutching-collar attached to said shaft, a pinion running loosely on said shaft and engaging a system of back gears, said pinion being provided with clutch-teeth, and a sliding sleeve concentric with said shaft and provided at each end with clutch-teeth, said sleeve being placed between the clutching-collar and the clutching-pinion and having a spline-connection with said driving-pulley, substantially as described.

3. The combination, with the driving-shaft of a drilling-machine, of a pulley running loosely on said shaft, a sliding sleeve having a spline-connection with said driving-pulley and provided with clutch-teeth, a system of back gears, the first gear in said system having clutch-teeth adapted to be engaged by the teeth of said sliding sleeve, and a sliding clutch-collar having a spline-connection with the shaft and arranged to be engaged with the last gear in said system of back gears, said sliding clutch-collar and said sliding sleeve being so connected as to have a simultaneous movement, substantially as described.

4. The combination, with the driving-shaft of a drilling-machine, of a driving-pulley running loosely on said shaft, a sliding sleeve inclosed in said pulley and having a spline-connection therewith and provided with clutch-teeth, and a clutch-collar attached to said driving-shaft and arranged to be engaged by said sliding sleeve, substantially as described.

5. The combination, with the driving-shaft of a drilling-machine, of a pulley running loosely on said shaft and having an internal hub C^2, a sliding sleeve held concentrically in said hub and having a spline-connection therewith, and a clutching-collar inclosed within said pulley and attached to said shaft and provided with clutch-teeth arranged to be engaged by said sliding sleeve, substantially as described.

6. The combination, with the driving-shaft of a drilling-machine, of a pulley running loosely on said shaft, a system of back gears, a clutching device between said pulley and said back gears, and a clutching device between said back gears and said driving-shaft, said clutching devices having a yielding connection, substantially as described.

7. The combination, with the shaft B, of the driving-pulley C, clutch-collar C′, attached to said shaft, sliding sleeve D, having a spline-connection with said driving-pulley and being provided with clutch-teeth, pinion E, having clutch-teeth, intermediate gears F and F′, gear H, having clutch-teeth, and clutch-collar I, sliding on the shaft B, said collar I and sleeve D having a common connected operative mechanism, substantially as described.

8. The combination, with the sliding sleeve D and the sliding clutch-collar I, of the operating lever-handle J, lever K, connecting-rod N, having collars R and R′, and spring P, substantially as described.

Dated at Worcester, in the county of Worcester and State of Massachusetts, this 17th day of July, 1890.

BENJAMIN G. LUTHER.

Witnesses:

RUFUS B. FOWLER,

H. W. FOWLER.