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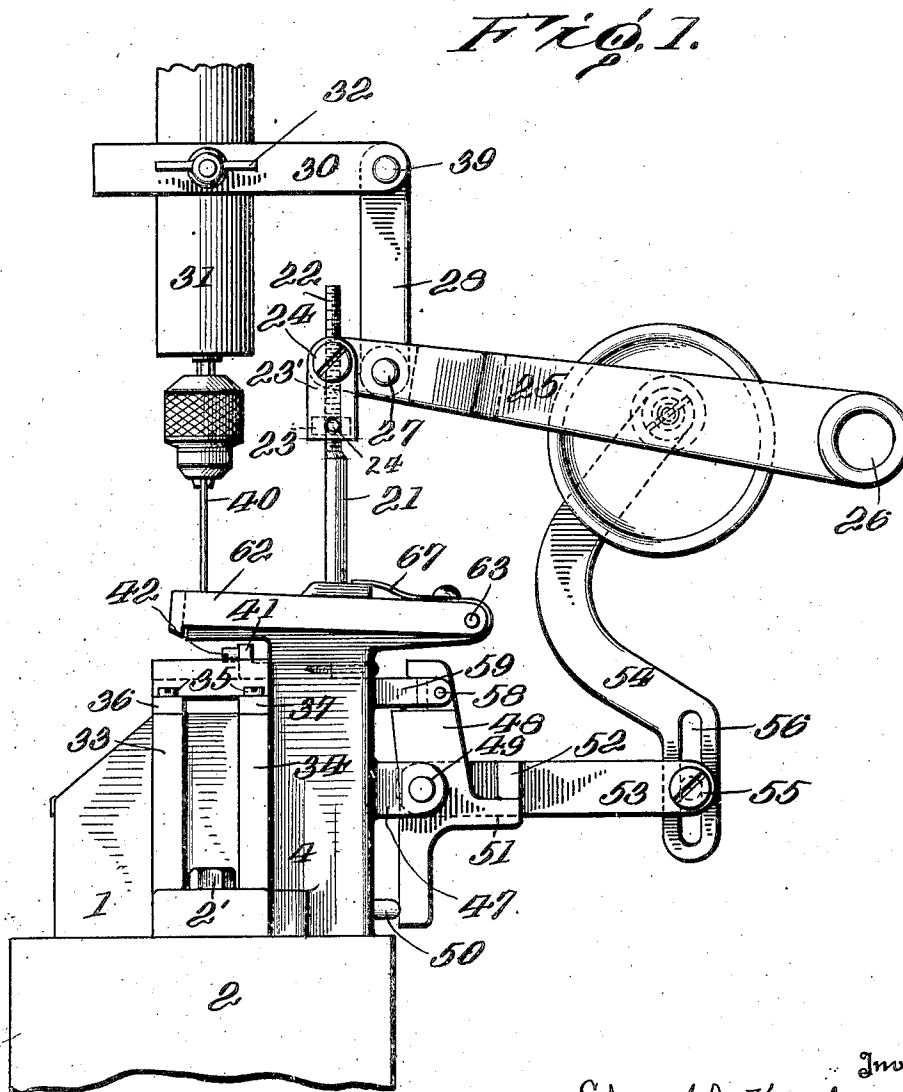
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E. J. KINGSBURY

AUTOMATIC DRILLING JIG

Filed Feb. 21, 1921

3 Sheets-Sheet 1



Inventor

Edward J. Kingsbury

By Shute and Mason

Attorneys

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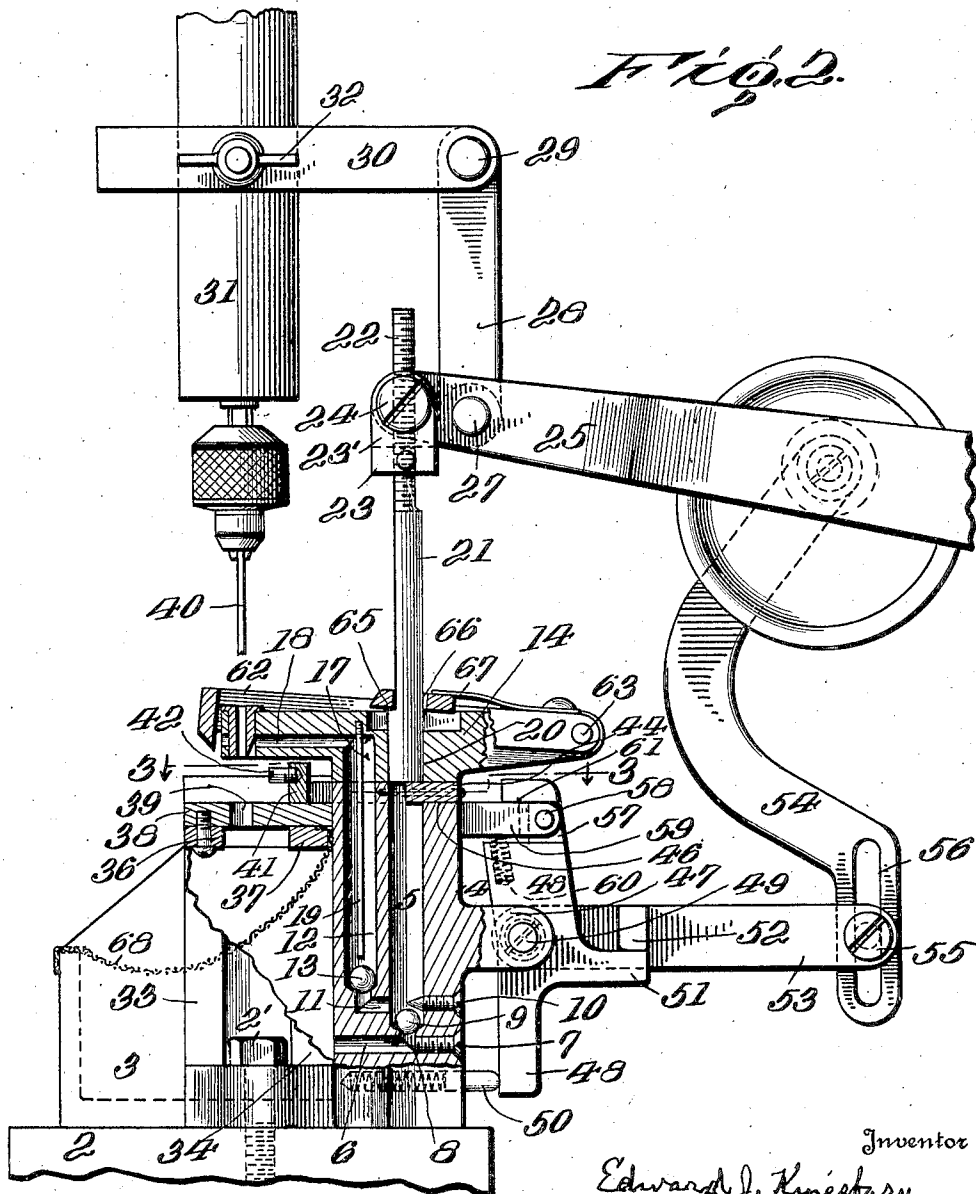
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Inventor

Edward J. Kingstary

By Shurtland Thayer

Attorneys

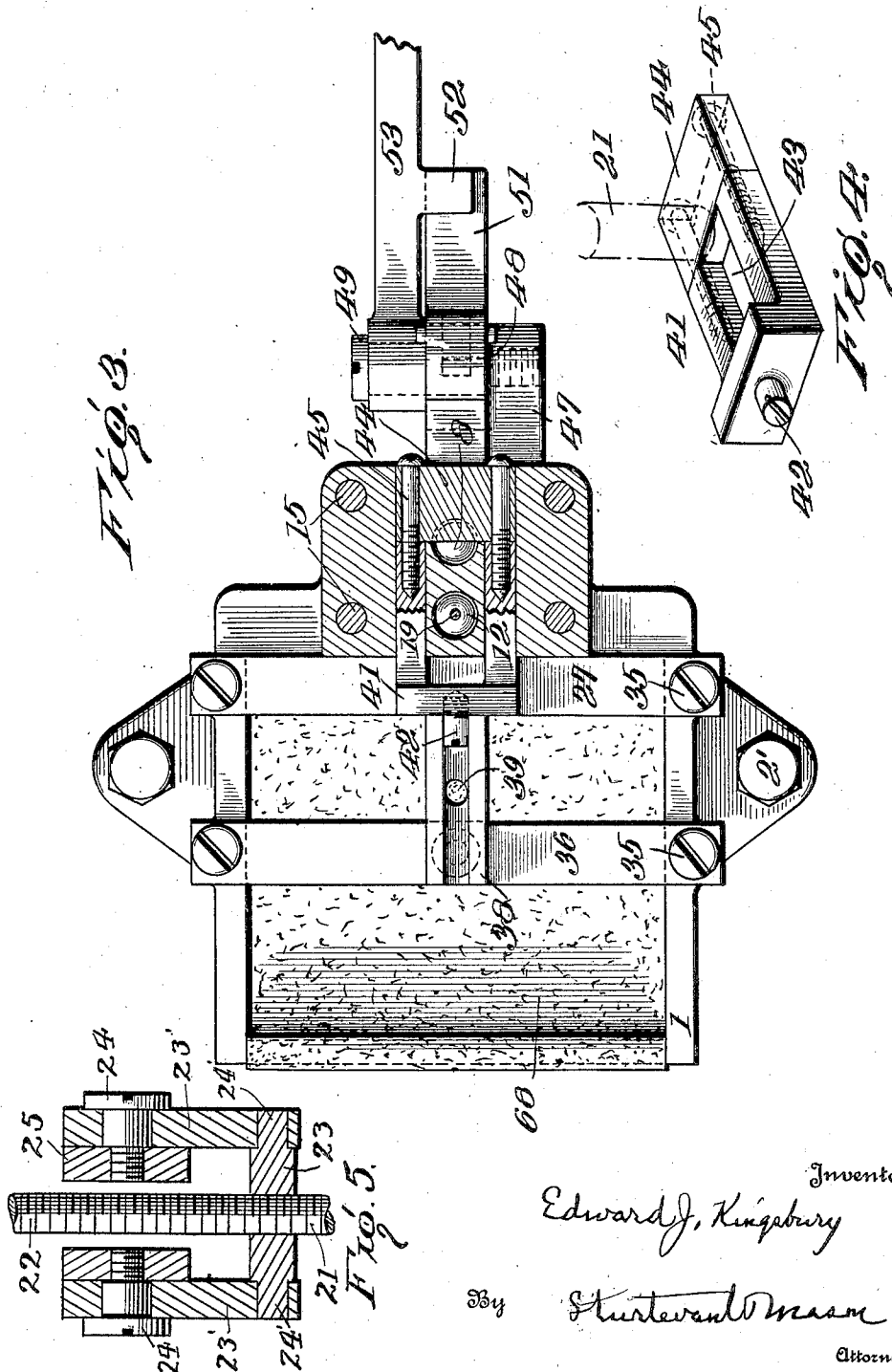
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3 Sheets-Sheet 3



Inventor

Edward J. Kingsbury

By

Sturtevant Mason

Attorney

UNITED STATES PATENT OFFICE.

EDWARD JOSLIN KINGSBURY, OF KEENE, NEW HAMPSHIRE.

AUTOMATIC DRILLING JIG.

Application filed February 21, 1921. Serial No. 446,666.

To all whom it may concern:

Be it known that I, EDWARD J. KINGSBURY, a citizen of the United States, residing at Keene, in the county of Cheshire, State of New Hampshire, have invented certain new and useful Improvements in Automatic Drilling Jigs, of which the following is a description, reference being had to the accompanying drawing and to the figures of reference marked thereon.

My invention relates to new and useful improvements in automatic drilling machines.

The object of my invention is to provide a mechanism which is adapted to be used in connection with almost any type of drilling machine and pertains particularly to the application of a pump formed integral therewith for supplying the cooling medium to the drill at a time when the drill is operating as well as means whereby the oil, or a certain portion, not consumed in the drilling operation, is strained and passed back to the pump to be used again.

Another object of my invention is to provide a drilling machine of this character in which the cooling medium supplying mechanism is controlled by the drill spindle and the work ejecting mechanism controlled by the pump for supplying the cooling medium to the drill, so that the drill can not operate without a supply of cooling medium, and the work can not be ejected while the cooling medium is being supplied.

A still further object of my invention is to provide a simple and effective drilling machine of this character, in which the oil supplying pump forms a dash-pot for the drill spindle, and having certain details of structure and combination of parts herein-after more fully described.

Referring to the drawings—

Figure 1 is a side elevation of my improved drilling machine;

Figure 2 is a side elevation, partly in section, showing the pump piston locked in its upward position;

Figure 3 is a horizontal transverse sectional view taken on the line 3—3 of Figure 2;

Figure 4 is a perspective view of the work gage.

Fig. 5 is an enlarged sectional view taken on the line 5—5 of Fig. 1.

Referring now to the drawings, 1 represents the main casting of the drilling ma-

chine which rests upon a base 2 of any description and is secured thereon by means of screws 2', as shown in Figure 2 of the drawings. This casting is of rectangular form and has at its forward end a hollow portion 3 which forms a receptacle to hold the coolant, in the form of a lubricant, and said portion is directly below the work holding mechanism. This casting, at its rear end, is provided with an enlarged solid portion 4 and has a vertical cylindrical bore 5 which extends from a point adjacent its lower end through the upper end and forms a pump cylinder. The casting at its lower end is provided with a horizontal passage 6, which extends entirely therethrough and has its outer end closed by a screw 7, so that access may be had thereto for cleaning the same. This passage 6 is in communication with the bore 5 by means of a restricted passage 8, which is closed by a ball valve 9, so that in the downward stroke of the pump piston the passage is closed and the return of the oil back to the oil or lubricant receptacle is prevented. In order to limit the upward movement of the ball valve, I have provided a screw 10, which passes inwardly from the rear wall, as shown in Fig. 2.

The casting 1 is provided with a horizontal passage 11 which communicates with the vertical passage 12 and a ball valve 13 is arranged therein to prevent the backward movement of the oil through the passage. Carried by the enlarged portion 4 of the casting is a casting 14 secured thereon by means of the bolts 15. Said casting 14 has at its upper end a broadened portion 16, spaced from the casting and has a vertical passage 17 which communicates with the passage 12. The upper end of the passage 17 has a horizontal passage 18 extending outwardly and ending at a point where the drill is working, as will be hereinafter more fully set forth. This casting 14 has a rod 19 extending through the passages 17 and 12 and ending close to the ball valve 13 so as to limit the upward movement of said valve.

The casting 14 has a vertical cylindrical bore 20 communicating at its lower end with the bore 5 and its upper end open, into which extends the pump piston 21. The upper end of the pump piston is screw-threaded at 22 and screws into a block 23 which is pivotally connected at 24' to the lower ends of the links 23'. The upper ends of the

links 23' are pivotally connected to the bifurcated ends of the lever 25 by the pivots 24, whereby the pump piston is free to move in a vertical direction while the lever 25 moves in the arc of a circle, as the opposite end of the lever is pivoted at 26. Pivotally connected to the lever 25, at 27, is a link 28, which has its upper end pivotally connected at 29 to the arm 30 carried by the drill spindle 31. This arm 30, as shown, is adjustably connected to the drill spindle by means of a thumb-nut 32, so that the lever 25 is rocked on its pivot by the reciprocation of the drill spindle for operating the pump piston 21.

The side walls of the casting 4 are provided with vertical ribs or enlargements 33 and 34 which extend to the upper end of the casting and to which are screwed, by means of the screws 35, the two transverse bars 36 and 37, upon which is bolted or screwed the work support 38 having openings 39 therethrough in direct alinement with the drill 40, carried by the drill spindle 31.

Sliding upon the work support is the work gage and ejector 41, which is of the shape shown in Figure 4 of the drawings, and has at its forward end the adjustable screw 42 for regulating the inward movement of the work. This gage, as shown, is provided with a bifurcated portion 43 adapted to straddle the casting 4 and closed by a removable plate 44 held thereon by means of screws 45. The upper end of the casting in the rear is cut away, as indicated at 46 and intersects the bore 5 of the casting 4, so that the plate 44 will extend across the bore 5 of the casting and support the pump piston 21 in its raised position, as shown in Fig. 2 of the drawings.

The rear end of the casting 4 is provided with an ear 47, upon which is pivotally mounted the intermediately pivoted lever 48, which is pivoted at 49 and has its lower end normally held away from the casting by means of the outwardly spring-pressed pin 50. The said lever 48 is provided with an outwardly extending arm 51 adapted to be engaged by the laterally extending lug 52 carried by the lever 53 which is also pivotally mounted upon the pivot 49, carried by the lug 47. The outer end of said lever is adjustably secured to the lower end of the link 54 by means of the screw 55 and slot 56 and the upper end of the link 54 is pivotally connected to the lever 25, intermediate its ends, so that the levers 53 and 48 are rocked with each movement of the drill spindle. The upper end of the lever 48 is cut away, as indicated at 57, and straddling the same is the bifurcated outer end 58 of the pivoted dog 59, and is normally held in its raised position by means of the spring 60. The upward movement of the dog is

limited by the shoulders 61, formed by the cut away portion 57.

The upper face of the plate 14 is provided with a pivoted work clamp 62, pivoted at 63 at its rear end and its forward end is adapted to drop down below the forward end 64 of the work supported by the work holder 38. The plate has a work clamp and is raised by the engagement of the shoulder 65, carried by the pump piston 21 which passes through the opening 66. The said work clamp is normally held down by the spring 67, so that, when the plunger is forced down by the movement of the drill (hereinafter more fully described) the same is forced down to clamp the work.

By this structure, it will be seen that oil is supplied to the working point of the drill upon each downward movement of the drill spindle by the pump piston and said piston also serves as a dash-pot to limit the rapidity of the downward movement of the drill spindle.

In operation, the work is placed upon the work holder 38 and forced in under the upper casting and engages the screw 42 of the gage 41 forcing the gage rearward to bring the portion 44 from below the lower end of the pump piston. The drill spindle is then lowered, the drill passing through the opening in the upper casting to the work. Simultaneous with the lowering of the drill spindle, the arm 30 forces the link 28 and lever downwardly, which carries the pump piston, and the oil is forced down the bore 5 of the cylinder through the passage 11 and upwardly and outwardly to the drill. The downward movement of the drill spindle is controlled by the pump piston owing to the restricted discharge. The lowering of the pump piston allows the work clamp to pass down and hold the work on the work support. Simultaneous with the downward movement of the pump piston, the link 54 is forced down, which forces the lever 53 down and the lug 52 engages the arm 51 and rocks the lever 48 on its pivot 49. The rear end of the gage has been forced out over the dog 59 and the spring 60 holds the dog in engagement therein. The continued downward movement will cause the end of the dog to pass upwardly and engage the rear end of the gage. Upon the return upward movement of the pump piston the lug 52 has moved away from the arm 51 and is some distance above the same. As soon as the piston has traveled above the gage, the spring plunger quickly snaps or forces the lever 48 over and carries the gage below the lower end of the piston and thus forces the work off of the work support. It being understood that on the upward movement of the piston the shoulder 65 has raised the work clamp in the position shown in Fig. 2 of the drawings. During the upward move-

ment of the piston the ball valve is closed and the valve 9 opened so that oil is drawn from the receptacle through the passage 6, the receptacle being provided with a screen 68 to filter the oil passing through the opening 39 in the work support before it enters the receptacle.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A drilling machine of the character described comprising a receptacle, a reciprocating pump piston in communication therewith, means operated by the downward movement of the drill spindle for forcing the pump piston down, a work support, the work support receiving oil from the pump, and means for locking the pump piston in an upward position.

2. A drilling machine of the character described comprising a receptacle, a work support, a drill spindle and its drill, a reciprocating pump piston in communication with the receptacle, means for connecting the drill spindle to the pump piston, a lock for holding the pump piston in an upward position, and means for operating said lock.

3. A drilling machine of the character described comprising a receptacle, a work support, a drill spindle and its drill, a reciprocating pump piston in communication with the receptacle, a connection between the drill spindle and the pump piston, a lock for holding the pump piston in an upward position, means operated by the work for releasing said lock, and means operated by the pump operating means for moving said lock into locked position.

4. A drilling machine of the character described comprising a receptacle, a work support, a drill spindle and its drill, a reciprocating pump piston in communication with the receptacle, a connection between the drill spindle and pump piston, means for conveying the oil from the pump to the work support below the drill, a lock for holding the pump piston in an upward position, and means operated by the drill spindle for moving the lock into locked position.

5. A drilling machine of the character described comprising a work support, a receptacle below the same, a drill spindle above the support, a pump piston in communication with the receptacle and adapted to supply oil therefrom to the work support below the drill spindle, means connected to the drill spindle for operating the pump, and a work gage carried by the work support adapted to lock the pump piston in a raised position when the work is removed from the support.

6. A drilling machine of the character described comprising a work support, a receptacle below the same, a drill spindle above the support, a pump piston in com-

munication with the receptacle and adapted to supply oil therefrom to the work support below the drill spindle, means operated by the drill spindle for working the pump, a work gage adapted to lock and support the pump piston in its raised position when released by the work, and means operated by the pump operating means for moving the lock into locked position upon the arrival of the pump piston at the end of its up stroke.

7. A drilling machine of the character described comprising a housing having an oil receptacle, a work support above the receptacle, a drill spindle above the work support, a pump cylinder communicating with the oil receptacle and having a passage leading from the cylinder to the work support directly below the drill spindle, a pump piston working in the cylinder and operatively connected to the drill spindle, a work gage on the work support and adapted to lock the pump piston in its upward position, and released by the engagement of the work, and means operated by the drill spindle for moving said gage outwardly for locking the pump piston in its raised position.

8. A drilling machine of the character described comprising a housing having an oil receptacle, a work support, a drill spindle, and a pump piston connected to the drill spindle for supplying oil to the work support and forming a dash-pot to regulate the downward movement of the drill spindle.

9. A drilling machine of the character described comprising a housing having an oil receptacle, a work support, a drill spindle, and a pump cylinder in communication with the receptacle, a pump piston connected to the drill spindle for supplying oil to the work support and forming a dash-pot to regulate the downward movement of the drill spindle, and automatic means for locking the pump piston in a raised position and throwing the work off of the work support.

10. A drilling machine of the character described comprising a housing having an oil receptacle, a work support above the receptacle, a drill spindle above the work support, a pump cylinder in communication with the receptacle and supplying oil to the work support directly below the drill, a pump piston within the cylinder, a link and lever connection between the drill spindle and the pump piston, a gage carried by the work support and adapted to lock the pump piston in its raised position and released by the insertion of the work on the work support, and means connected to the pump operating means for moving the gage outwardly for locking the pump piston, and snapping the work from the work support.

11. A drilling machine of the character described comprising a housing, a work support, an oil receptacle, a pump piston, a drill

- spindle, a link and lever connection between the pump piston and the drill spindle, a work gage adapted to lock the pump piston in its raised position and released by the insertion of the work, and a link and lever connection for forcing the gage outwardly when the pump piston has reached its limit of upward movement and forcing the work from the work support.
12. A drilling machine of the character described comprising a housing, a work support, an oil receptacle, a pump piston, a drill spindle, a connection for operating the pump piston with the drill spindle, a gage sliding on the support and adapted to lock the pump piston in its raised position and operated by the insertion of the work, means operated by the pump operating mechanism for snapping the gage over to lock the piston when raised, and a work clamp operated by the pump piston.
13. A drilling machine of the character described comprising a housing, a work support, a pump cylinder, a drill spindle, a pump piston in the cylinder for forcing the oil to the work support below the drill spindle, a gage sliding in the work support and adapted to lock the pump piston in its raised position and to be released by the insertion of the work on the support, means operated by the drill spindle for operating the pump piston, an intermediately pivoted spring pressed lever having a spring pressed dog adapted to engage the gage when the pump piston has reached its upward movement for snapping the gage over for locking the piston and forcing the work from the work support and operated by the drill spindle.
14. A drilling machine of the character described comprising a housing, a work support, an oil receptacle below the work support, a drill spindle above the work support, a pump cylinder in communication with the receptacle having a passage leading to the work support, a pump piston in the cylinder, a link and lever connection between the pump piston and the drill spindle, a gage on the work support adapted to slide under the pump piston for locking it in its raised position, an intermediately spring pressed lever adjacent the gage, a spring pressed dog adapted to engage the gage and move it outwardly for discharging the work from the support and locking the piston in its raised position, said gage being moved by the insertion of the work for releasing the piston, a link and lever connection with the pump operating means for operating the intermediately pivoted lever, and a pivoted work clamp operated by the pump piston.
15. A drilling machine of the character described, comprising a receptacle, a reciprocating pump piston in communication therewith, a drill, and means connecting the drill to the pump piston whereby oil is forced to the work and the pump forms a dash pot to control the downward movement of the drill.
16. A drilling machine of the character described, comprising a receptacle, a reciprocating pump piston in communication therewith, a drill, a work support, a lock for holding the pump piston in an upward position, and means connecting the drill to the pump piston, whereby oil is forced to the work and the pump forms a dash pot to control the speed of the downward movement of the drill.
- In testimony whereof, I affix my signature.
- EDWARD JOSLIN KINGSBURY