H. A. OGLE.

DRILLING MACHINE.

APPLICATION FILED NOV. 29, 1909. RENEWED JULY 22, 1911.

1,017,990. Patented Feb. 20, 1912.

2 SHEETS—SHEET 1.

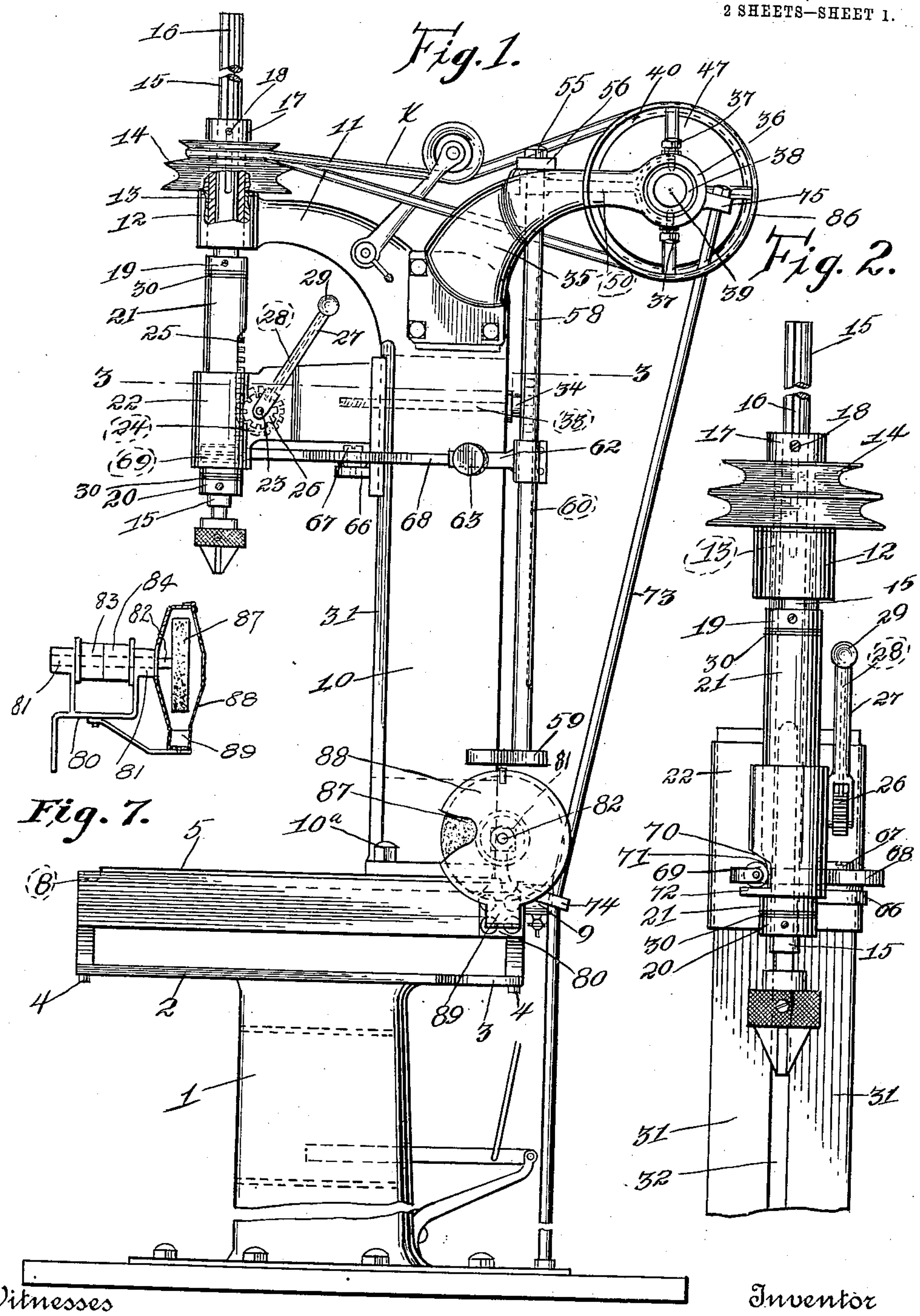

Fig. 1. Fig. 2. Fig. 7.

Witnesses

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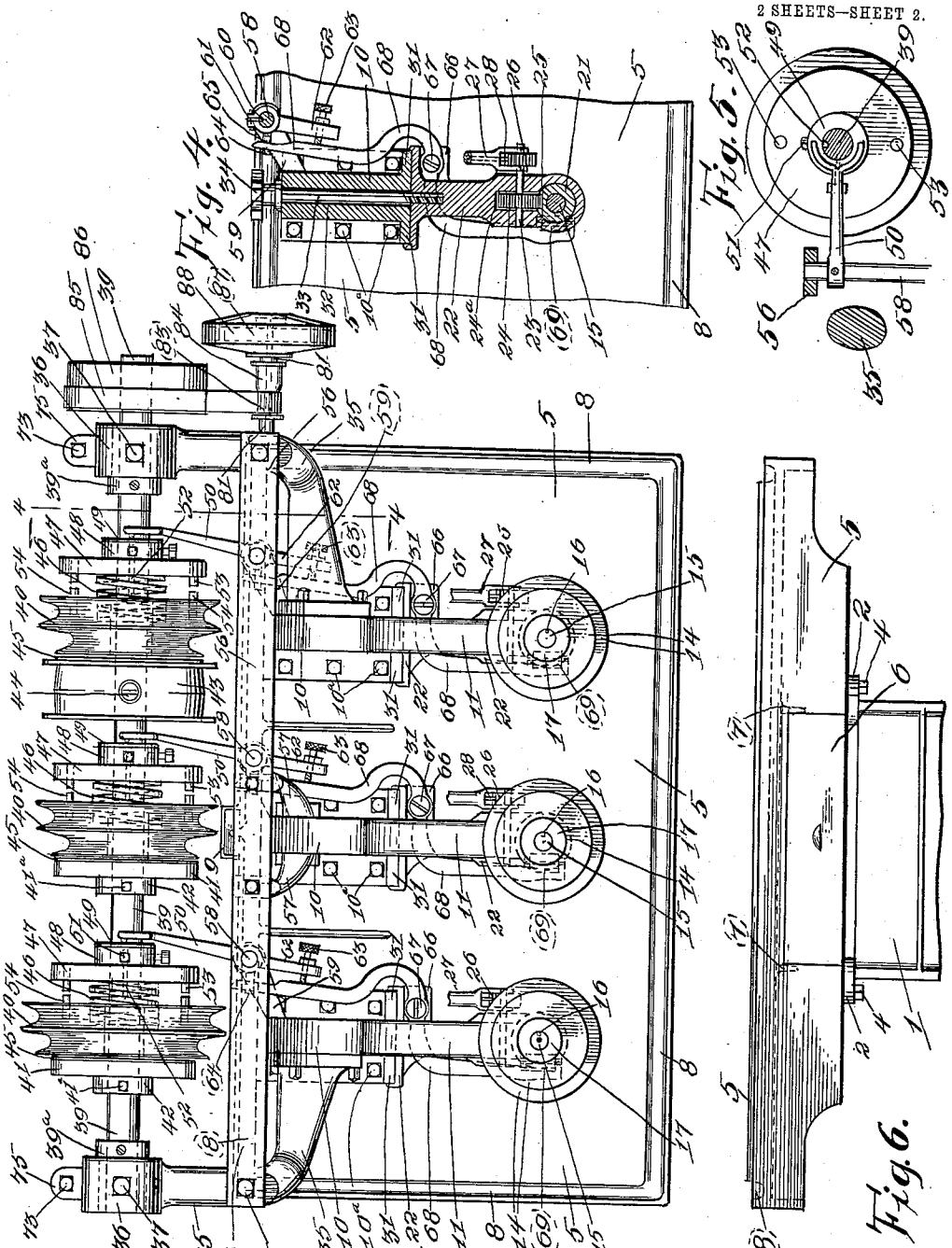

Fig. 3.

Fig. 5.

Fig. 6.

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HARLEY ALFRED OGLE, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-THIRD TO EDWIN O. ROWE AND ONE-THIRD TO JOE S. LOSEE, BOTH OF HEBRON, ILLINOIS.

DRILLING-MACHINE.

1,017,990. Specification of Letters Patent. Patented Feb. 20, 1912.

Application filed November 29, 1909, Serial No. 530,441. Renewed July 22, 1911. Serial No. 640,018.

To all whom it may concern:

Be it known that I, HARLEY ALFRED OGLE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Drilling-Machines, of which the following is a specification.

My invention relates to a multiple spindle drilling machine, but more particularly to a machine of this type in which the drill spindles are arranged in vertical parallel relation to each other, and are all driven from one main driving shaft.

The principal object of my invention comprehends the production of a machine of the above character in which the main driving shaft is provided with an independent driving pulley and clutch for each of the drill spindles and having means automatically operated by the lowering of the different spindles, to feed the drills into the work, for throwing the clutch members into engagement with the driving pulleys, whereby only the spindle being used will be running, while the unused spindles will be idle, thereby preventing any unnecessary wear.

A further object of my invention resides in producing a machine of the above kind of such construction that the spindles will have a long range of adjustment vertically with respect to the work holding table.

Further objects and advantages will become apparent as the nature of my invention is better understood from the following description and accompanying drawings, in which—

Figure 1 is an end elevation of a drilling machine constructed in accordance with my invention, with parts thereof broken away. Fig. 2 is a front elevation of one of the drill spindles. Fig. 3 is a top plan view of the machine complete. Fig. 4 is a horizontal sectional view taken on the line 3—3 of Fig. 1. Fig. 5 is a fragmental sectional view taken on the line 4—4 of Fig. 3 looking in the direction indicated by the arrows, and Fig. 6 is a front view of the work holding table. Fig. 7 is a detail, partly in section, showing the emery wheel.

Reference being had to the drawings and the numerals indicated thereon, 1 indicates an upright base which, in cross-section, is of substantially U-shape, which has its upper end provided with forwardly extending arms 2 and a rearwardly extending lug 3. Fastened to said arms 2 and the lug 3, by means of screw bolts 4, is the work holding table 5. By referring to Fig. 6, it will be seen that the front side of the work holding table 5 is cut out for the reception of a drawer 6, which rests on the upper faces of the arms 2 adjacent their inner edges, and is guided by the reinforcing ribs 7 formed on the under side of the work holding table. Formed in the upper side of said table 5, near the edges thereof, is a gutter 8 which empties into a receptacle 9 formed on the rear side of the table at about the center thereof, said gutter serving to convey the waste oil used in drilling to the receptacle 9 from which it may be drawn for reuse.

Fastened, by means of bolts 10^a, to the upper side of the work holding table 5 adjacent its rear side, are a number of standards 10 spaced at equal distances apart. By these standards 10 the different parts of my invention are supported. The upper ends of the standards are formed with forwardly extending arms 11 having boxings 12 formed in the ends thereof. Placed in each of the boxings 12 is a bronze bearing 13, which extends above the boxing a suitable distance, and has loosely mounted thereon a graduated grooved pulley 14. Loosely mounted in each of the bearings 13 is a drill spindle 15 having a longitudinal groove 16 formed therein. Formed on the upper side of each pulley 14 is a hub 17 which is splined to the spindle 15 by means of a set screw 18, the inner end of which enters the groove 16. It will thus be seen that said pulleys 14 are prevented from turning on the spindles 15, but that said spindles will be permitted to move up or down.

Placed loosely on each of the spindles 15 between upper and lower collars 19 and 20 respectively, fixed rigidly to said spindles, is a feeding sleeve 21, which is loosely mounted in the outer end of a bracket 22, which in turn, is slidably mounted on the standard 10 in a manner to be hereinafter described. Passing transversely through the bracket 22, at a suitable distance from the rear side of the feeding sleeve 21, is a shaft 23 on which is fixed a pinion 24, said pinion 24 working in a pocket 24^a formed in the bracket 22, and adapted to engage rack teeth 25 formed on the rear side of the feeding sleeve 21. By referring to Fig. 2

it will be seen that the shaft 23 projects beyond the right hand side of the bracket 22 and has fixed to said projecting end a notched wheel 26, and also has loosely mounted thereon the lower forked end of the feed lever 27, the said wheel 26 occupying a position between the arms of the fork. Passed longitudinally and centrally through the lever 27 is a rod 28, the lower end of which is adapted to engage one of the notches of the wheel 26, and which has its upper end provided with a knob 29. By this arrangement it will be seen that by pulling on the lever 27 it will cause the pinion 24 to revolve and move the rack 25, thereby causing the feeding sleeve 21, together with the spindle 15, to move downwardly to feed the drill into the work, and when the lever gets to near a horizontal position the rod 28 may be pulled outwardly by means of the knob 29 to withdraw its lower end from the notch it then rests in, and brought back to normal position and the feeding of the drill continued. Interposed between the collars 19 and 20 and the ends of the feeding sleeves 21 are fiber washers 30, for the purpose of preventing wear on these parts.

The front faces of the standards 10 are provided with outwardly projecting flanges 31 which form guides for the inner ends of the brackets 22. Each standard 10 is also provided with a slot 32 formed centrally therethrough. As most clearly shown in Fig. 4, a bolt 33 is passed through the slot 32 and is screwed into the bracket 22, thereby connecting said bracket to the standard 10. The rear end of the bolt 33 is provided with a hand wheel 34. By this arrangement it will be seen that by loosening the bolt 33 the bracket 22, together with the parts carried thereby, may be moved up or down on the standard 10 as desired, and by tightening the bolt 33, may be rigidly held at the desired adjustment.

Securely fastened to the upper ends of the end standards 10, are arms 35, which extend upwardly and outwardly from the said end standards and then rearwardly, and have formed in the outer ends of said rearwardly projecting portions, boxings 36. Suspended in said boxings 36, by means of set screws 37, are bronze journal bearings 38, in which the main driving shaft 39 is journaled, said shaft 39 being held from longitudinal movement by collars 39ª fixed to said shaft 39 adjacent the inner sides of the boxings 36. Loosely mounted on the shaft 39 at points on a line with the centers of the drill spindles 15 are pulleys 40, similar to the pulleys 14 of the said drill spindles 15. A round belt X passes over and connects each pulley 40 with its corresponding pulley 14, and by placing said belt X in the large groove of the pulley 40 and the small groove of the pulley 14, and vice versa, the speed of the drill spindles may be readily changed. It will also be readily understood that the speeds of the different spindles may be varied according to the size of the drill, by simply providing pulleys 40 of different diameters. The pulleys 40 are held from longitudinal movement on the shaft 39 in one direction by means of disks 41 fixed rigidly to said shaft by means of set screws 41ª passing through one side of the hubs 42 formed on the outer sides of said disks 41, and the main driving pulley 43 fixed to said shaft 39 by means of the set screw 44, which also serves as a means for imparting motion to said shaft 39 from any source of power.

Fastened to the inner sides of each of the disks 41 and the pulley 43 is a leather ring 45 for a purpose to be hereinafter referred to. The sides of the pulleys 40 farthest from the disks 41 and driving pulley 43, are each provided with a recess for the reception of one end of a coiled spring 46 the outer ends of which bear against the clutch members 47. These clutch members are each provided with a hub 48 which is, in turn, provided with a fiber ring 49 to prevent wear on the clutch shifting arms 50 to be hereinafter referred to. To permit the shifting of the clutch members 47 they are splined to the shaft 39 by means of set screws 51 the inner ends of which work in longitudinal grooves 52 formed in one side of the shaft 39. Securely fastened in the clutch members 47 are pins 53 which project a short distance beyond the inner faces of said clutch members and are adapted, when the clutch members are shifted by the arms 50, to engage the sides of similar pins 54 fastened to the sides of the pulleys 40 adjacent the aforesaid clutch members, thereby connecting the clutch members and the pulleys together. However, before the pins 53 and 54 come into engagement with each other, the coiled springs 46 would have pressed the sides of the pulleys 40 against the leather rings 45 of the disks 41 and the driving pulley 43 with sufficient force to impart the motion of the shaft 39 to said pulleys 40 by frictional adherence. It will thus be seen that any sudden jar, which would occur if the clutch members 47 were thrown directly into engagement with the pulleys 40, is prevented.

Fastened to the arms 35 by means of bolts 55, at points suitably remote from the peripheries of the pulleys 40, is a bar 56 which is braced intermediate its ends by arms 57 securely fastened at their lower ends on opposite sides of the middle standard 10, and at their upper ends to said bar 56. Rotatably mounted in the bar 56 are the upper ends of the rods 58, their lower ends resting in projections 59 formed on the sides of the standards 10, near the lower ends thereof. These

rods 58 are located adjacent the right hand sides of the standards 10, and have formed in one side thereof a groove 60. Splined to each of the rods 58, by means of the key 61 entering the groove 60, is a forwardly extending arm 62, provided at its front end with an adjusting screw 63, and having formed on one side of its inner end a projection 64 provided with a slot 65, for a purpose to be hereinafter referred to. Securely fixed to each of the rods 58 at points directly opposite and on a line with the main shaft 39 are the inner ends of the clutch shifting arms 50 heretofore mentioned.

Formed on the right hand edge of each of the brackets 22, near its lower end, is a projection 66 to which is pivoted, by means of a screw 67, an operating arm 68. As most clearly shown in Figs. 2 and 3, these arms 68 extend under the brackets 22 from the pivot points and forwardly adjacent the left hand sides of said brackets, and rearwardly from the pivot points adjacent the right hand sides of the standards 10, and engage the inner ends of the adjusting screws 63, and have their inner ends reduced to work in the slots 65 of the projections 64. The front end of each of said arms 68 has journaled therein a roller 69.

As shown in Fig. 2, the lower portions of the sides of the brackets 22, at their outer ends, are cut away, as at 70, so as to expose the inclined notch 71 formed in the lower end of the feeding sleeves 21, in which notches the rollers 69 are adapted to normally rest. The lips 72, formed on the brackets 22 at the lower ends of the cut away portions 70, serve to support the rollers 69.

The machine is suitably braced by rods 73 anchored at their lower ends in the base 1 and passing through apertured lugs 74 formed on the rear side of the work holding table 5, and fastened at their upper ends to similar lugs 75 formed on the rear sides of the boxings 36 of the arms 35.

Mounted on the right hand side of the work holding table 5 is a forked bracket 80 having boxings 81 formed in its upper ends. Journaled in the boxings 81 is a shaft 82 on which is mounted a loose and a fixed pulley, 83 and 84 respectively, to which power is transmitted by means of a belt 85 from a pulley 86 fixed to the outer end of the main shaft 39. Fastened to the outer end of the shaft 82 is an emery wheel 87 inclosed in a hood 88, said hood being provided with a pocket 89 and having its outer side hinged for the purpose of opening the hood to clean out the pocket.

Briefly stated, the operation of the mechanism above described, for starting and stopping the different drill spindles independently, is as follows: When either of the feeding sleeves 21 is moved downwardly by pulling on the feed lever 27, to feed the drills into the work, the inclined face of the notch 71 will engage the roller 69 of the operating arm 68 and cause the same to swing on its pivot 67 as is obvious, and this will cause the arm 62 to swing outwardly and the rod 58 to turn, which in turn, will cause the clutch shifting arm to swing inwardly, thereby causing the clutch member 47 to move toward the pulley 40. Just as soon as this action takes place, the coiled spring 46 will press the pulley 40 against the leather ring 45 with sufficient force to start the pulley by frictional adherence, before the pins 53 of the clutch member engage the sides of the pins 54 of the pulley, thereby preventing any sudden jar. As the feeding sleeve 21 is lowered the roller 69 will ride along the straight face thereof and firmly hold the clutch member in engagement with the pulley, but when the sleeve is raised to withdraw the drill from the work, the roller will ride down the straight face of the sleeve until it enters the notch 71, when the parts will be returned to their normal position by means of the spring 46, to stop the drill spindle. The inner ends of the operating arms 68 working in the slotted projections 64 serve as a means for raising and lowering the arms 62 when the brackets 22 are adjusted along the faces of the standards 10 to accommodate for work of different thicknesses. As shown in Fig. 4, the slot 65 is long enough to permit the operating arms to swing freely.

I claim:

1. A drilling machine comprising a plurality of standards, a drill spindle loosely mounted in each standard, a pulley splined upon each of said spindles, a horizontal driving shaft journaled in portions of said standards, pulleys loosely mounted on said driving shaft for each of said spindles, belts connecting the respective driving shaft and spindle pulleys, and means actuated by the lowering of the spindles to feed the drills into the work, for imparting the motion of said driving shaft to each of the respective pulleys mounted thereon.

2. A drilling machine comprising a plurality of standards, a drill spindle vertically mounted in the upper end of each of said standards, a feeding sleeve mounted on each of said spindles and held in position thereon by collars fixed to said spindles, said sleeves loosely mounted in the outer ends of brackets slidably mounted in said standards, and having inclined notches formed in their lower ends on one side thereof, an operating arm pivoted to the inner end of each of said brackets, a roller journaled in the outer end of each of said operating arms and adapted to rest in said notches, whereby, when either of said sleeves is lowered, the inclined face of its notch will engage the roller and cause the said operating arm to swing on its pivot,

and means actuated by said operating arms for starting and stopping each of the drill spindles independently.

3. In a drilling machine, the combination with a plurality of drill spindles arranged in vertical parallel relation, of a graduated grooved pulley splined to each of said spindles, a main driving shaft arranged horizontally to the rear of said spindles and having loosely mounted thereon graduated grooved pulleys for each of the spindles, members fixed to said driving shaft adjacent one side of each of said pulleys, and each having a leather ring fastened thereto on its side adjacent said pulleys, a clutch member slidably mounted on said shaft adjacent the opposite side of each of said pulleys, springs interposed between said clutch members and the adjacent sides of said pulleys, and means automatically operated on the lowering of the aforesaid spindles to feed the drills into the work, for shifting the clutch members into engagement with the pulleys, independently.

4. In a drilling machine, a drill spindle, driving and feeding means for the drill spindle, the feeding means including a recessed member movable therewith, a pivoted arm carrying a roller adapted to move into and out of the recess for swinging the arm on its pivot, a clutch device for the driving means, and a connection between the aforesaid arm and the clutch device for actuating the latter.

5. In a drilling machine, a standard, a drill spindle carried thereby, a bracket mounted on the standard, a sleeve on the spindle slidably mounted in said bracket, an operating arm pivoted to said bracket and carrying a roller adapted to enter an inclined notch in the sleeve, a rod rotatably mounted adjacent to the standard and having an arm which is operatively connected to the aforesaid operating arm, a driving shaft, a clutch member mounted on said shaft, and clutch operating means connected to the aforesaid rod.

In testimony whereof I affix my signature in presence of two witnesses.

HARLEY ALFRED OGLE.

Witnesses:
E. H. Bolz,
Arthur Wesley.