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A. SCHIEFER.

DRILLING MACHINE.

No. 561,346. Patented June 2, 1896.

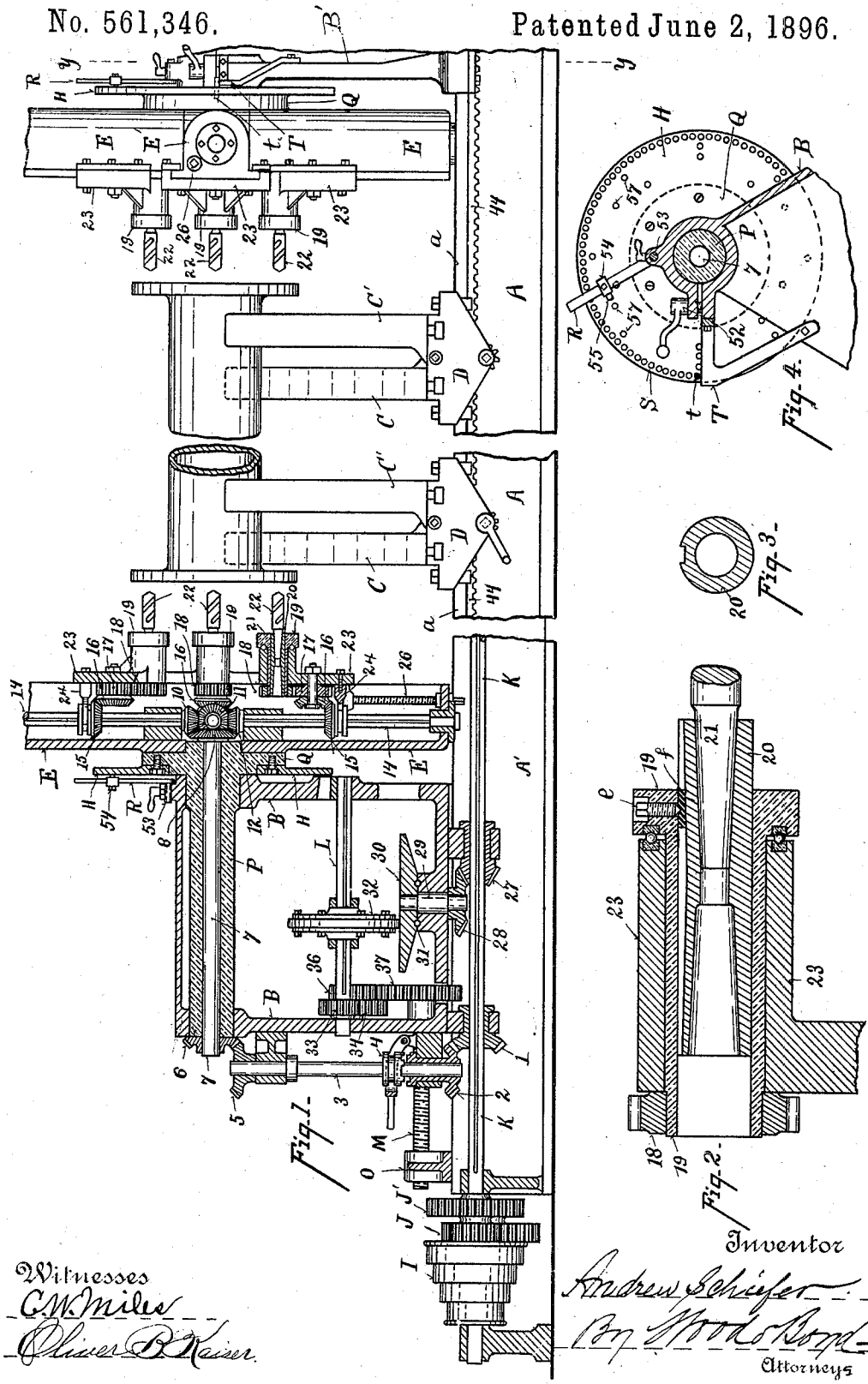

Fig. 1.

Fig. 4.

Fig. 3.

Fig. 2.

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DRILLING MACHINE.

No. 561,346. Patented June 2, 1896.

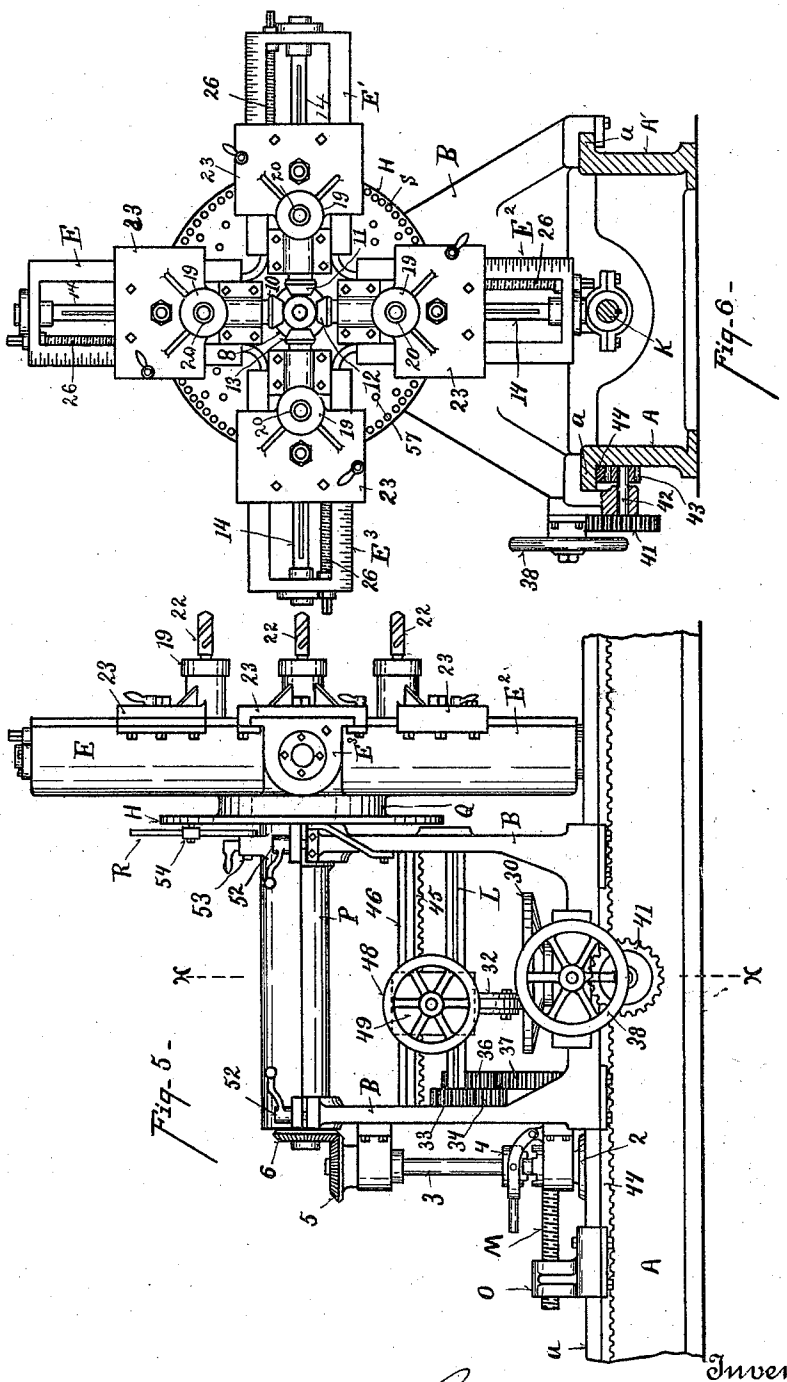

Fig. 6.

Fig. 5.

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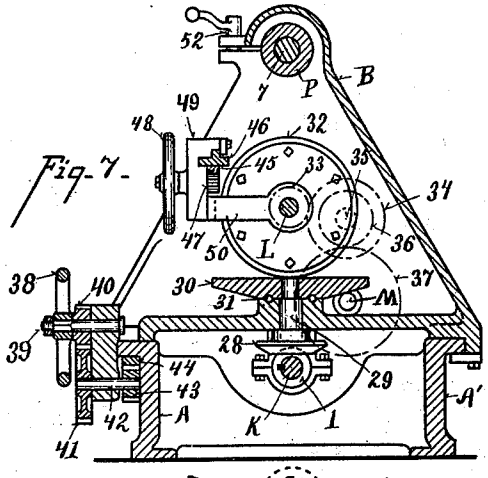
Fig. 7.



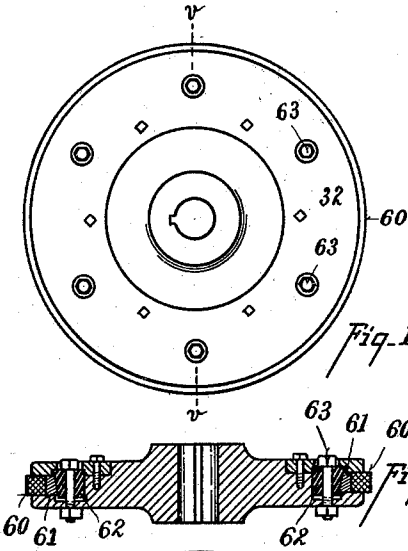
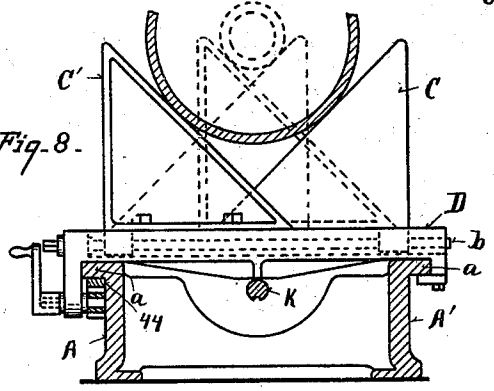


Fig. 11.

Fig. 12.

Fig. 8.



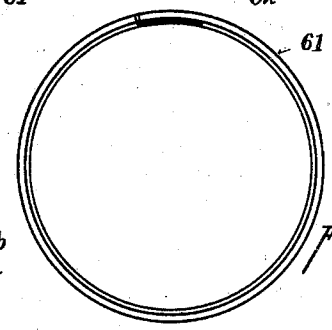
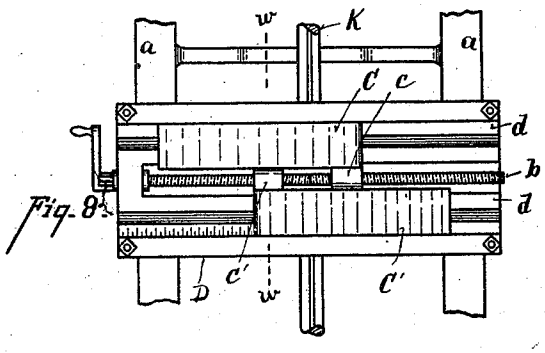


Fig. 13.

Fig. 8.



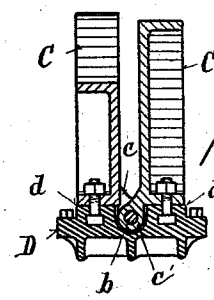


Fig. 10.

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DRILLING MACHINE.

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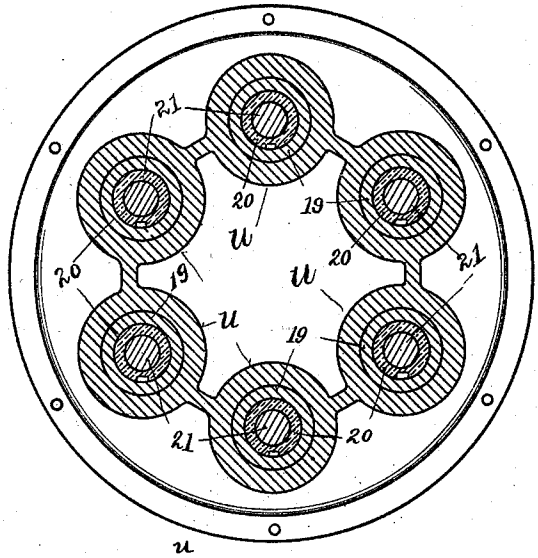
Fig. 14.



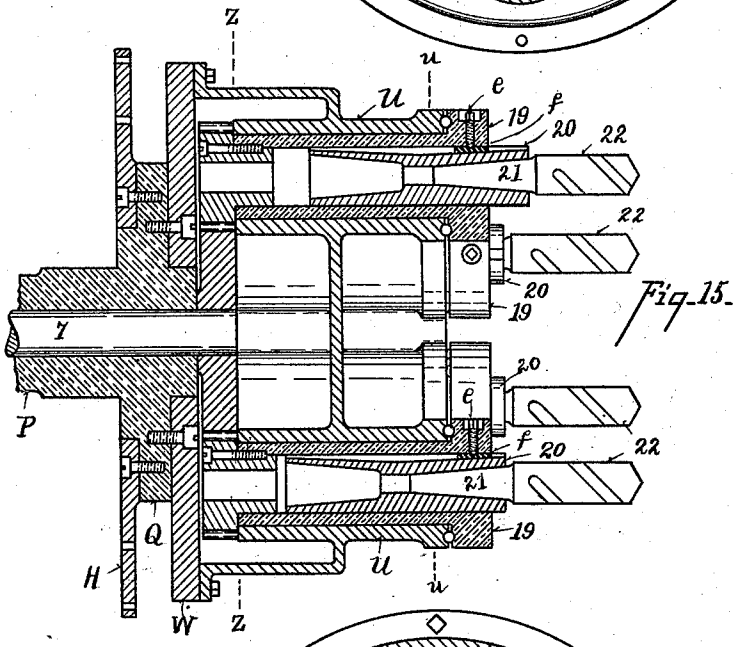
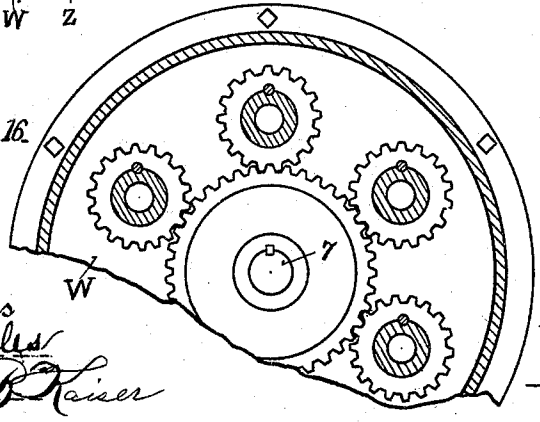


Fig. 15.

Fig. 16.



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UNITED STATES PATENT OFFICE.

ANDREW SCHIEFER, OF FERNBANK, OHIO.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 561,346, dated June 2, 1896.

Application filed May 27, 1895. Serial No. 550,864. (No model.)

To all whom it may concern:

Be it known that I, ANDREW SCHIEFER, residing at Fernbank, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Drilling-Machines, of which the following is a specification.

The object of my invention is to provide a double-headed drilling-machine, each head being provided with a series of drilling-spindles primarily adapted to bore simultaneously a series of holes in both flanges of cylinders and pipes.

Another object of my invention is to construct a series of spindles and driving mechanisms so that they may be adjusted both radially and circumferentially to suit the different classes of work.

Another object of my invention is to so construct the heads that they may be adjusted longitudinally to suit the character of the work.

Another object of my invention is to provide driving and feeding mechanisms so as to operate the drills on both heads simultaneously.

Another object of my invention is to provide a suitable jack-frame for holding the article in position, with mechanism for adjusting the same to different sizes of work.

Another object of my invention is to provide gage mechanism for setting the drill circumferentially to any predetermined position and rigidly holding the same to the adjustment.

The features of my invention will be more fully set forth in the description of the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side elevation, partly in section, of my improvement. Fig. 2 is a sectional detail view of one of the drill-chucks. Fig. 3 is a cross-section of the chuck-spindle. Fig. 4 is a detail elevation of the gage-setting mechanism on line *y y*, Fig. 1. Fig. 5 is a side elevation of one of the drill-heads and its driving mechanism mounted upon the frame. Fig. 6 is an end view of Fig. 5. Fig. 7 is a sectional elevation on line *x x*, Fig. 5. Fig. 8 is an end elevation of the supporting-jack mounted upon the frame. Fig. 9 is a top plan view of Fig. 8, with the section of pipe removed. Fig. 10 is a section on line *w w*, Fig. 9. Fig. 11 is a side elevation of the friction-disk. Fig. 12 is a section on line *v v*, Fig. 11. Fig. 13 is a side elevation of the spreading-ring. Fig. 14 is a section on line *u u*, Fig. 15. Fig. 15 is a longitudinal central vertical section of a modified form of drill-head. Fig. 16 is a section on line *z z*, Fig. 15.

A A′ represent bed-rails, which form the frame of the machine. The tops of these rails are provided with flanges *a*, serving as ways on which the frame of the drill-heads and the supporting-jacks are supported and adjusted.

B represents a hollow frame-support upon the ways of the bed-frame, upon which frame are supported the drill-heads, within the hollow of which journals the feeding-gear.

C C′ represent supporting jack-frames. These jack-frames are supported upon the bed-plate D, which is longitudinally adjusted upon ways *a*, and the jack-frames are transversely adjusted on said bed-plate. In the preferred form of construction each drill-head is provided with four arms E E′ E^2 E^3, but as many arms may be employed as desired. H represents the gage-setting dial.

The details of construction of the several parts of my drilling-machine are as follows:

I represents a cone-pulley; J J′, back gears for driving the main shaft K at different speeds. These parts are of ordinary construction. The said shaft K extends through the machine and operates both the drilling and the feeding mechanisms, one set of mechanism being the counterpart of the other.

The drill-driving mechanism is constructed as follows: 1 represents a bevel-gear splined upon the shaft K, driving the bevel 2 upon shaft 3. 4 represents a clutch connecting bevel 2 to its shaft, so that the shaft may be thrown in or out of gear, as desired. 5 represents a bevel-gear upon the upper end of said shaft driving bevel-gear 6 on shaft 7. On the opposite end of said shaft is a bevel-gear 8, which transmits motion to the driving mechanism of the drill-spindles of this head by means of bevels 10, 11, 12, and 13. These bevels are each mounted on radial shafts 14, which are journaled in the hollow arms E E′ E^2 E^3 and are each splined and provided with a bevel-gear 15, which is feathered thereon, so as to be adjustable longitudi-

nally on said shaft. These gears 15 respectively in turn drive the gears 16.

The several drill mechanisms are each of the same construction as the other and a description of one will explain the others. Gear 17 is mounted on the same shaft with gear 16 and transmits motion to gear 18, which is mounted on the drill-spindle sleeve 19. 20 represents a chuck-spindle splined within the sleeve-spindle 19. 21 represents the shank of the drill. 22 represents the drill. The shaft of the gears 16 17 is journaled in the head-plate 23, which is adjusted on ways of one of the arms E. 24 represents a yoke secured to said plate and engaging with the grooved sleeve 25, formed on the hub of the gear 15, so that as said head-plate 23 is moved radially on the arm E gear 15 will be moved simultaneously with the head-plate, sliding on shaft 14 to adjust the same to any desired position. 26 represents screw-shafts, which journal in the end flanges of the arms E and engage with the plate 23, so as to readily adjust the same by turning the said screw-rod, which holds them in the adjusted position.

In order that the drills may be fed forward and backward at any desired speed, I have provided a variable feed mechanism, which moves the frames B and the contained drill-heads forward and backward upon their ways in the following manner: 27 represents a gear splined upon the shaft K, which meshes and drives the gear 28 upon shaft 29. 30 represents a friction-disk rigidly connected to said shaft and preferably supported upon ball-bearings 31. 32 represents a friction-wheel splined upon shaft L, so that it may be adjusted radially upon the friction-disk 30, so as to increase or decrease the speed of shaft L and also to allow the said shaft L to be driven in either direction by shifting the said friction-wheel 32 across the center of the disk 30, so as to feed the drill-carriage B forward or backward.

M represents the screw feed-shaft, which is driven from shaft L as follows: 33 represents a gear upon shaft L driving gear 34 upon stud-shaft 35. 36 represents another gear upon the said stud-shaft, which meshes with and drives the gear 37 and screw-shaft M. (See Fig. 7.) The screw-shaft M engages with the yoke O, which is clamped to the bed A. Hence as screw-shaft M is driven frame B is moved backward and forward on the ways of the frame A.

In order that the frames B B′ may be shifted to and from each other on the ways of the main frame by hand, I provide the following mechanisms: 38 represents a hand-wheel on shaft 39. (See Fig. 7.) 40 represents a spur-gear mounted thereon and driving-gear 41 on shaft 42. 43 represents a gear on the inner end of said shaft, which meshes with rack 44, secured to the under side of the flange of the main frame. Now by releasing the yoke O from its attachment to the bed-plate and turning the hand-wheel 38 the said frame B and its yoke can be moved longitudinally on the ways of the main frame.

In Figs. 5 and 7 I have shown the preferred form of mechanism for shifting the friction-wheel 32 across the center of the friction-disk 30. 45 represents a rack on the guide-bar 46, fixed within the frame B. 47 represents a spur-gear meshing with the rack 45, which is driven by hand-wheel 48, which is supported upon carriage 49, traveling on said bar. 50 represents the arms of a yoke connected to the carriage 49, in the ends of which friction-wheel 32 is journaled. When said hand-wheel 48 is turned, the carriage 49 is moved and carries the friction-wheel 32 radially across the friction-disk 30 in the direction required.

In order that the arms E of the drill-head may be turned to adjust the drills circumferentially by the operator to any desired position, I provide the following mechanisms: Shaft 7 journals within sleeve P, which is mounted in bearings on the frame B. It is provided with the face-plate Q, to which the several arms E are secured. 52 represents clamp-nuts for securing the sleeve P within its journal to prevent rotation in its adjusted position. The dial-plate H is rigidly secured to the face-plate Q. R represents a setting-arm, the inner end of which is journaled on pin 53. It is provided with the gage-block 54, which carries the pin 55, which engages with one of the holes 57. When the pin 55 is in one of the holes 57, the dial-plate is secured to its adjusted position. *t* represents a pin in one of the holes S, resting against the guard T. Now if it is desired to turn the dial-plate H and move the drill-arms E, which are secured thereto, the pin is moved to any of the holes S in the disk H, to which point it is desired to move the drills. The nuts 52 are slackened and the dial-plate H and arms E, mounted thereon, and the sleeve P may be revolved till the said pin strikes the guard. The object of this adjustment is as follows: Suppose there are four drills, as shown in the drawings, and it is desired to drill eight holes equidistant apart. One set of holes is drilled and then the setting-dial H is turned one-eighth of a revolution, which will set the drills in position to drill four more holes equidistant from the holes already drilled. Thus any desired number of duplicate sets of holes may be drilled accurately and as required. The supporting jack-frames C are preferably made of angle form, as shown in Fig. 8, and they are adjusted to or from each other to suit the various sizes of cylinders to be supported thereon by means of the right and left hand screw-rod *b*, (see Fig. 9,) which taps the ears *c c′* of the respective frames C C′. These frames are held in position by means of the ways *d*. Thus the jack-frames are radially adjustable to suit any desired size of work and rigidly held in the fixed position to support the same. Scale-marks may be placed

upon the ways *d*, so as to assist in adjusting the position of the jacks for different sizes of work.

I have shown in Figs. 14, 15, and 16 modifications of the drill-heads with a series of sleeves U, rigidly connected to a circular head W, secured to the face-plate Q. The sleeves U are not adjustable radially upon the head-plate W. The object of this modification is to be interchangeable with the forms of arms shown in Fig. 1. Thus where there is to be a large number of holes drilled in a pipe of a given size the unadjustable head may be made interchangeable with the adjustable head.

In order to adjust the drills longitudinally in their supporting-sleeves, so that drills of different lengths may be used, I have provided the following mechanisms: The drill-sleeve 19 is provided with a set-screw *e*, (see Fig. 2,) which taps through said sleeve and engages with the feather-block *f*, which slides in the taper-spline of chuck 20, by means of which said chuck may be adjusted longitudinally and securely held to the adjusted position. The taper spline and key serve as a wedge to hold the same firmly in its adjusted position.

In Figs. 11, 12, and 13 is illustrated the construction of the friction-disk 32. 60 represents a friction-ring, which engages the face of disk 30; 61, a split metallic ring beveled upon its inner face; 62, a ring beveled upon its outer face and engaging with ring 61 to spread the same together with the friction-ring 60 in order to obtain a suitable tension between the disks 30 and 32. 63 represents bolts by means of which the ring 62 is adjusted and held in position.

I claim—

1. In a boring-machine, a hollow drill-frame mounted and traveling upon ways of the base-frame and carrying drill-actuating mechanism, a threaded feeding-shaft M journaled in said frame, an interiorly-threaded yoke O detachably affixed to the base-frame and engaging said threaded shaft, driving mechanism carried by said drill-frame and operating to transmit motion to the feed-shaft for moving said frame and its contained drill-driving mechanism longitudinally upon the said ways, and hand feeding mechanism by which said drill-frame may be fed by hand when the yoke O is detached from the base-frame, substantially as described.

2. In a drilling-machine, the combination with a traveling supporting-frame, of a sleeve carried thereby, a series of radial drill-arms carried by said sleeve, a series of radial drill-driving shafts mounted on said arms, a shaft journaled in the said sleeve and transmitting motion to said radial drill-shafts, means for rotating said sleeve to circumferentially adjust the drills, and means for holding it in its adjusted position, substantially as described.

3. In a drilling-machine, the combination with a traveling supporting-frame, of a sleeve P journaled in said frame, a driving-shaft 7 journaled in said sleeve, a clamp 52 for holding said sleeve against rotation, a series of drill-driving shafts arranged radially around and receiving motion from said driving-shaft 7, mechanism for adjusting the drills and their driving mechanisms longitudinally on their supports, means for rotating the sleeve P to circumferentially adjust the drills when the clamp is loosened, and means for holding it in its adjusted position, substantially as described.

4. In a drilling-machine the spindle-sleeves 19, chuck 20 provided with a tapered spline, a taper-key fitting in said spline, and means for clamping said key in any desired adjusted position, substantially as specified.

5. In a friction driving-wheel the combination of the friction peripheral ring 60, the split friction-ring 61, and the wedge-ring 62, secured to the periphery and disk thereof, substantially as specified.

In testimony whereof I have hereunto set my hand.

ANDREW SCHIEFER.

Witnesses:
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C. W. MILES.