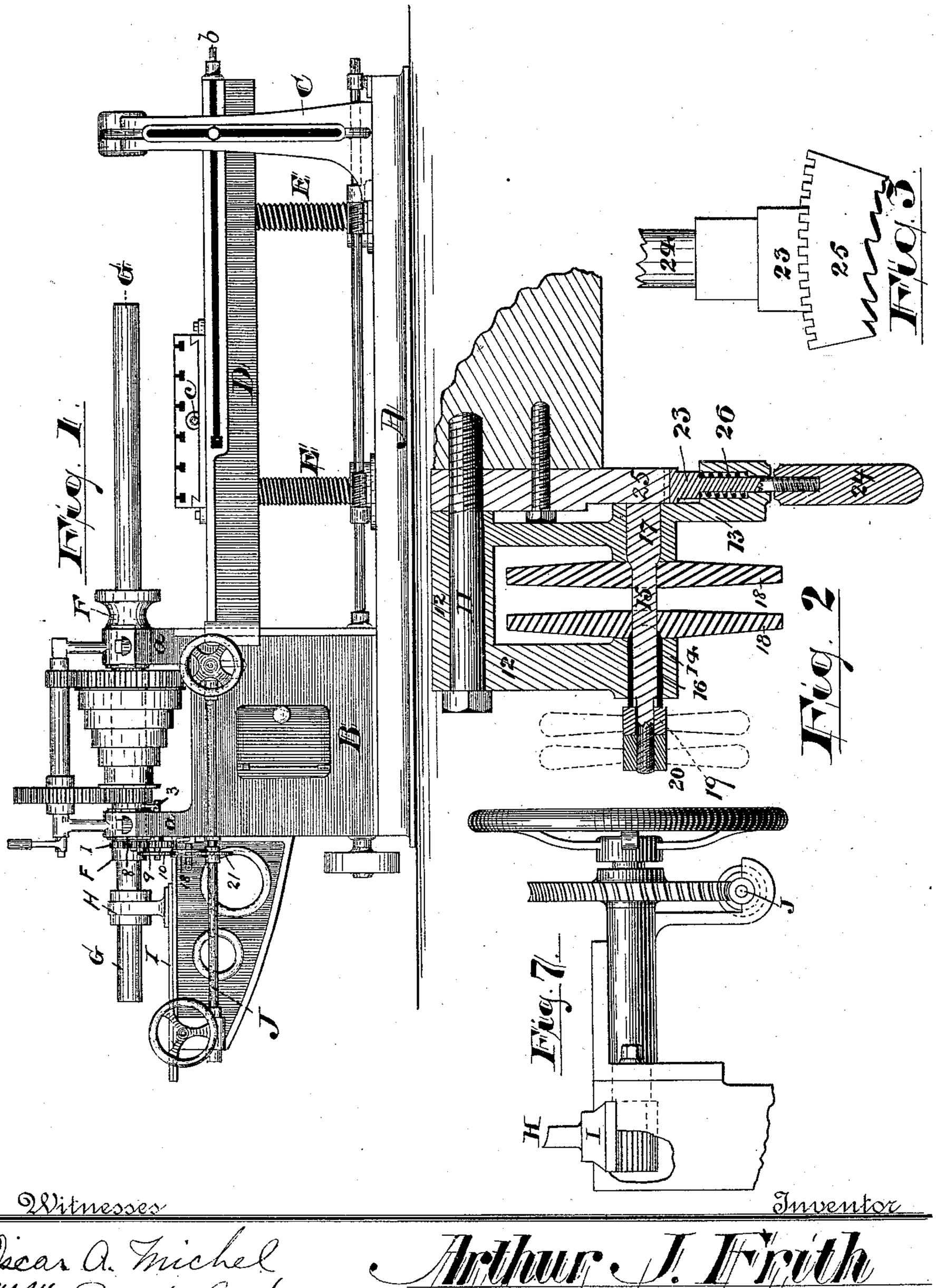
(No Model.) 2 Sheets—Sheet 1.

A. J. FRITH.

HORIZONTAL BORING MACHINE.

No. 494,100. Patented Mar. 21, 1893.



Witnesses

Oscar A. Michel

Wm. Breitenbach.

Inventor

Arthur J. Frith

By Drake & Cy Attys.

(No Model.) 2 Sheets—Sheet 2.

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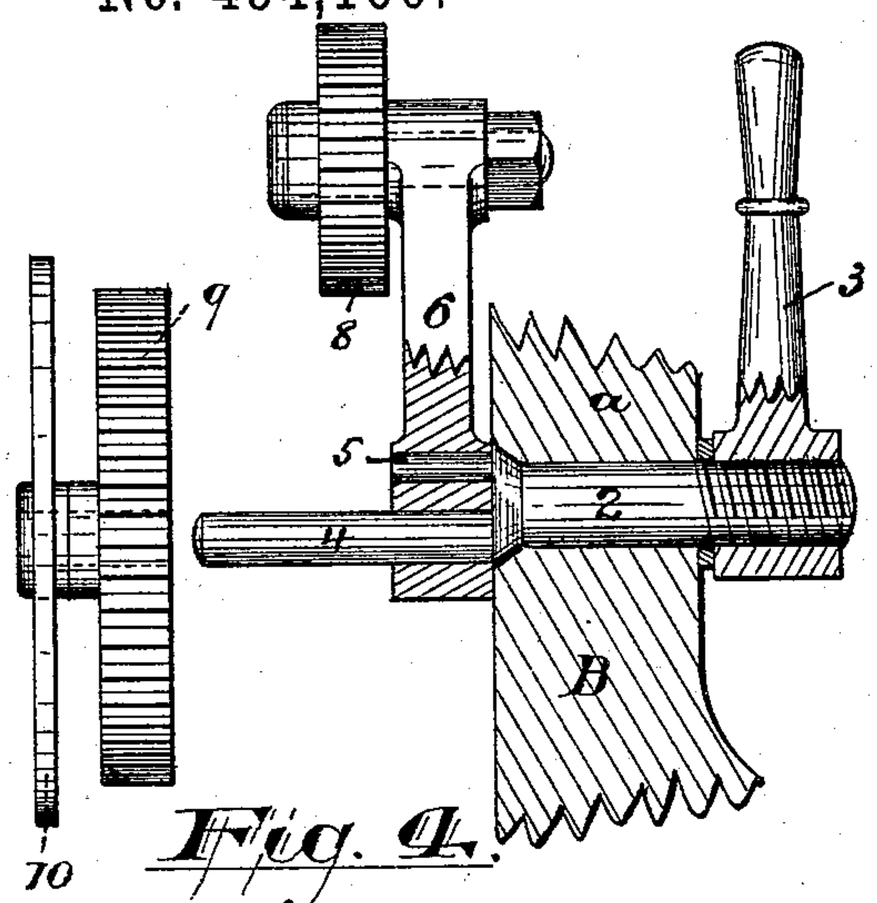

Fig. 4.

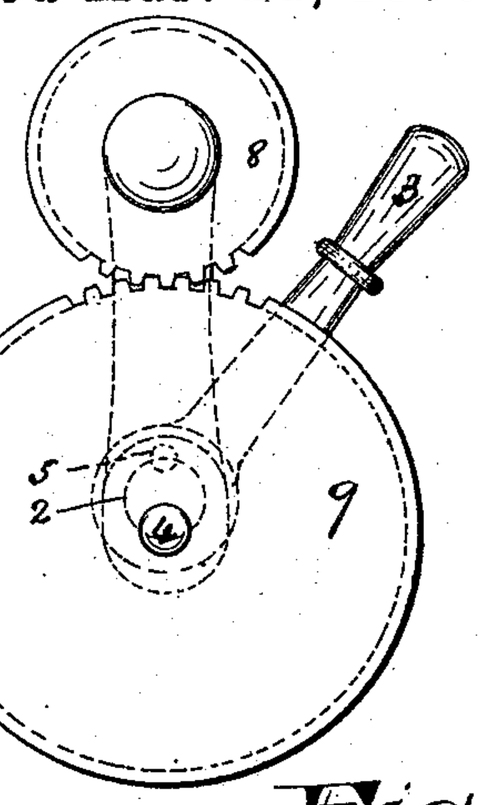

Fig. 5.

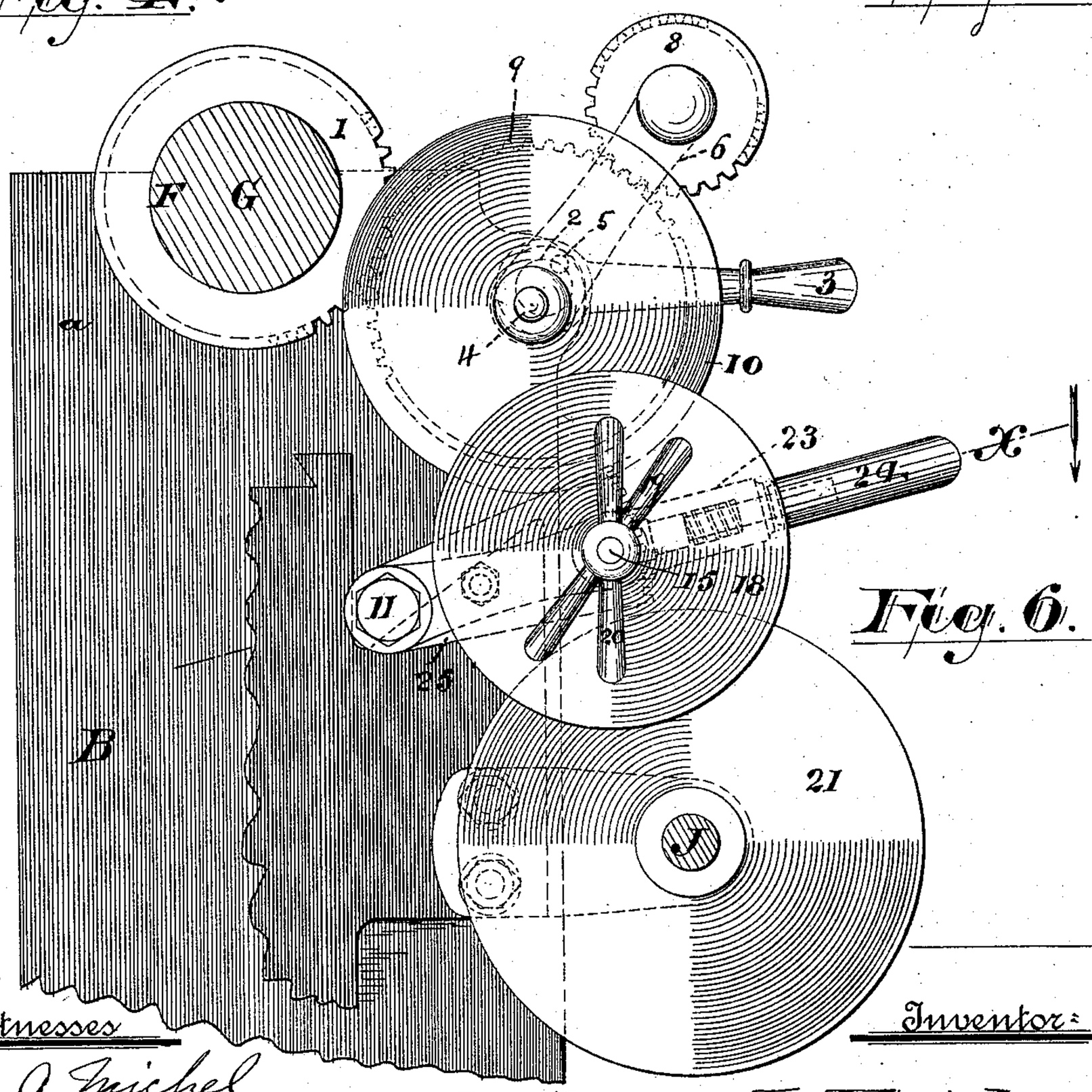

Fig. 6.

Witnesses
Oscar A. Michel
Wm. Bruntenbach

Inventor:
Arthur J. Frith.
By Drake & Co Atty's.

UNITED STATES PATENT OFFICE.

ARTHUR J. FRITH, OF NEW YORK, N. Y.

HORIZONTAL BORING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 494,100, dated March 21, 1893.

Application filed April 14, 1892. Serial No. 429,086. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR J. FRITH, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Horizontal Boring-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters and figures of reference marked thereon, which form a part of this specification.

This invention relates more particularly to that class of horizontal boring machines in which a heavy bed or supporting base carries a large head at one end, a yoke at the other and intermediate lifting screws on which a carriage for the cylinder, or work to be operated upon, is seated, the said work being bolted or otherwise secured to said carriage. The head carries in its boxes a hollow spindle which is operated by a cone or series of graduated pulleys and by back gears. A boring bar receives its motion of translation while it revolves with the spindle. The adjustments of work to the boring bar are made by screws which move the said work horizontally, with a portion of the carriage to and from the head and transversely across the table. While these typical features have been in use many years, until this invention, there has not been a satisfactory feed motion.

Friction disks have been employed in connection with other means for securing a feed motion, and these have been constructed and used in various ways, but are open to various objections that it is the general object of this invention to avoid or overcome.

The more specific objects of my invention are, to secure a wider range of changes in feed motions; to enable the feeding operations to be entirely stopped, started, thrown out or reversed, without stopping the machine, and the feeding mechanisms to be disconnected from the driving gear; to reduce the noise of operation and prevent breakage owing to carelessness on the part of the workmen. The novel construction also secures other advantages and results some of which will be referred to in connection with the descriptions of the working parts.

Referring to the accompanying drawings, embraced in two sheets, in which like letters and figures of reference indicate corresponding parts in each of the several views, Figure 1 is a side elevation showing, in general, the relations of the several parts one to the other. Fig. 2 is an enlarged detail section taken on line *x*, Fig. 6. Fig. 3 is a detail side view of a certain handle and segment for adjusting the feed motion. Fig. 4 is a detail showing means for securing a reverse motion. Fig. 5 is a side view of portions of the same, and Fig. 6 is a side view showing the parts more particularly embracing the invention in their operative relations, more generally. Fig. 7 is a detail illustrating means for operating the feed.

In said drawings, A indicates the base or bed of the machine, B the head providing boxes or bearings *a*, *a*, for a spindle.

C indicates an ordinary yoke secured on the bed at the end thereof opposite the head.

D indicates a carriage supported on screws E, E, and vertically adjusted thereby, parts of which carriage have a longitudinally horizontal movement controlled by a screw, *b*, and a transverse movement controlled by a screw *c* all in the usual manner. A hollow spindle, F, works in the boxes *a*, *a*, and in this is arranged a boring bar, G, which has a rotary motion with the spindle F, and an independent longitudinal movement or feed motion or thrust controlled by an ordinary yoke, H, and rack I supporting said yoke in the usual manner. The said rack is moved in its longitudinal bearings by the ordinary pinion and worm gearing by power received from the feed shaft J.

The features of novelty in this invention inhere more particularly in the construction and arrangement of parts for operating said shaft, J.

At the end of the hollow spindle F is secured a spur wheel, 1, by which the feed system is driven. Adjacent to this wheel, upon the frame of the machine, is arranged a rock shaft, 2, adapted to be rigidly set upon said frame by a hand nut, 3, or to be loosened to admit of a partial rotation of said shaft in its

bearings, as will be clearly understood upon reference to Fig. 4. At the end of said shaft opposite the hand nut are formed or arranged two pintles 4 and 5 upon which an arm 6 is placed and caused to turn with said rock-shaft. At its projecting end, the said arm carries a small cog or gear wheel 8 adapted to mesh with the spur wheel, 1, on the hollow spindle. The pintles 4 and 5 vary in length, and on the outer end of the longer one, 4, which is eccentric to the axis of the rock shaft, is arranged a larger gear or cog wheel 9 which meshes with the small cog wheel 8 and, on turning the rock shaft, may be moved into engagement with or disengaged from the wheel 1, as will be understood. By loosening the rock-shaft, the arm, 6, is also loosened in its bearings so that it may be turned with said rock shaft, a movement in one direction removing the cog, 8, from the cog 1 and causing the cog 9 to move toward said cog 1, and a movement of the arm in the opposite direction resulting in a reverse movement of said cogs. The movement of the cog 9 is occasioned by the eccentricity of the pintle 4. Thus by simply loosening the hand-nut, 3, the cogs may be adjusted to reverse the feed motion or to entirely disconnect the feed mechanisms from the boring mechanisms.

Upon the pintle 4, with the larger cog wheel, 9, is arranged a friction disk 10. The preferable arrangement is shown in the drawings where the said disk is provided with a laterally projecting integral bushing, shown in outline in Fig. 4, which bushing enters the cog wheel and is keyed thereto in any suitable manner to prevent independent movement.

Below the mechanisms just described is fulcrumed, as at 11, Fig. 6, a lever like frame 12 indicated in side elevation in said Fig. 6, and in central horizontal section in Fig. 2; said frame consists of a forked casting having two arms, 13, 14, connected at the fulcrumed end and at its projecting ends providing bearings for the disk shaft, 15, and bushing clamp 16. The arm, 13, receives the enlarged head 17 of the disk-shaft and the other arm, 14, receives the bushing clamp as shown in Fig. 2. The said shaft 15 receives the disks 18, 18, between the said enlarged head and the inner end of the bushing clamp and the said disks 18, 18 are arranged on opposite sides of the friction disk, 10, and are securely and rigidly clamped against the same by screwing up the hand nut 19 against the end of the bushing, 16, and forcing the latter hard against the side of the disk so that the said disk has a firm frictional contact with the disk 10. The hand nut, 20, serves as a screw shaft holder, to prevent the shaft, 15, from turning, when the friction on its threads exceeds the friction tending to prevent such turning, as will be understood, the said hand nut being suitably provided with a key to prevent independent turning.

Below the disk, 10, is arranged another friction disk 21, which is fastened to the feed shaft, J, and transmits power thereto. The disks 18, 18 bear oppositely against said disk 21, with the same unyielding contact as upon the disk, 10, and thus there is no slipping, but proper transmission of motion. The co-operating friction disks admit of an infinite number of variations of adjustment and thus differ materially from intermeshing cogs, in the transmission of power which require a multiplication of parts in proportion to the variations desired.

The arm or fork, 13, of the fulcrumed frame, 12, is provided with a handled catch 23, of which 24 indicates the handle. Said catch has movement to and from a segmental rack, 25, fastened to the frame or head of the machine, the extremity of the catch having teeth corresponding with those on the rack. By drawing upon the handle, against the power of the spring, 26, Fig. 2, the catch is disengaged from the rack and the fulcrumed frame may be raised or lowered with the disks 18, 18, carried thereby and, as a result, the relations of the disks are altered and the movements correspondingly varied at pleasure. The spring, 26, holds the catch and segment in fixed relation normally, so that there is no danger of improper alteration or change.

The operations of the invention having been described in connection with the descriptions of the working parts, further and more general descriptions are thought to be unnecessary here.

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

1. In a boring machine, the combination with the hollow spindle and boring bar having a rotary motion with said spindle and an independent longitudinal movement, a feed shaft communicating its movement to said longitudinally movable bar, a friction disk on said feed shaft, a friction disk receiving its motion from said spindle and intermediate friction disks clamping said disks with an unyielding pressure, substantially as set forth.

2. In a boring machine, the combination with the hollow spindle and boring bar, a friction disk receiving its motion from said spindle, a feed shaft and a friction disk communicating its motion thereto, of a frame 12, having arms 13—14, bar 15 carrying clamping disks 18, 18, a clamping bushing extending through one of said arms and engaging one of said disks, and a hand nut for forcing said bushing against one of said disks and the latter into unyielding engagement with the co-operating disks, substantially as set forth.

3. In a friction feed, the combination of the fulcrumed frame, having arms 13—14, disk-carrying shaft, 15, threaded at one end and having an enlarged head, 17, receiving the side of one of the friction disks at the other, a bushing arranged in the arm 14, around the shaft 15 and engaging the opposite side of the other disk, and hand nuts for forcing said

disks into firm contact with co-operating disks, substantially as set forth.

4. In combination, in a horizontal boring machine, with a cog wheel, 1, arranged on the hollow spindle, *f*, a shaft, 2, having a hand nut, 3, pintles 4 and 5, an arm, 6, carrying a cog wheel, 8, a cog wheel, 9, arranged on the pintle 4, a friction disk, 10, movable with said cog wheel 9, and friction disks 18 and 21, the latter arranged on the feed shaft, substantially as set forth.

5. In combination, in a horizontal boring machine, with a longitudinally movable shaft, a spindle giving rotary motion to said shaft a cog arranged on said spindle a rock shaft having cogs 8 and 9 movable to and from said cog, 1, means for setting the shaft and holding said cogs in the operative positions, a disk, 10, operating with said cog 9, a disk 21 arranged on the feed shaft, intermediate friction disks 18, transmitting power from the disk 10 to the disk 21 and means for transmitting motion from said feed shaft to said longitudinally, movable boring tool shaft, substantially as set forth.

6. In a horizontal boring machine, the combination with a longitudinally movable boring shaft, a hollow spindle having a rotary movement a friction disk receiving its movement from said spindle, a friction disk arranged in connection with the feed shaft, said feed shaft and means for transmitting the motion thereof to the longitudinally movable boring shaft, a frame, 12, adjustable on the frame of the machine, intermediate friction disks arranged on said adjustable frame and means for holding said adjustable frame in position, substantially as set forth.

7. In a boring machine, the combination with the rotary and longitudinally movable boring shaft and feeding shaft, of friction disks connecting with said shafts, and a fulcrumed frame having a spring-actuated catching handle, 24, arranged on one of the arms of said frame, a toothed segment engaged by said catching handle, a shaft, 17, arranged on the arms of the frame, clamping disks, a hand nut and an inelastic bushing interposed between one of said clamping disks and said nut and imparting an unyielding pressure to the said disk, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 23d day of January, 1892.

ARTHUR J. FRITH.

Witnesses:
A. B. MORGAN,
E. H. WIES.