No. 745,414. PATENTED DEC. 1, 1903.

T. J. BLOSS.

MILLING AND KEY SEAT CUTTING MACHINE.

APPLICATION FILED AUG. 10, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

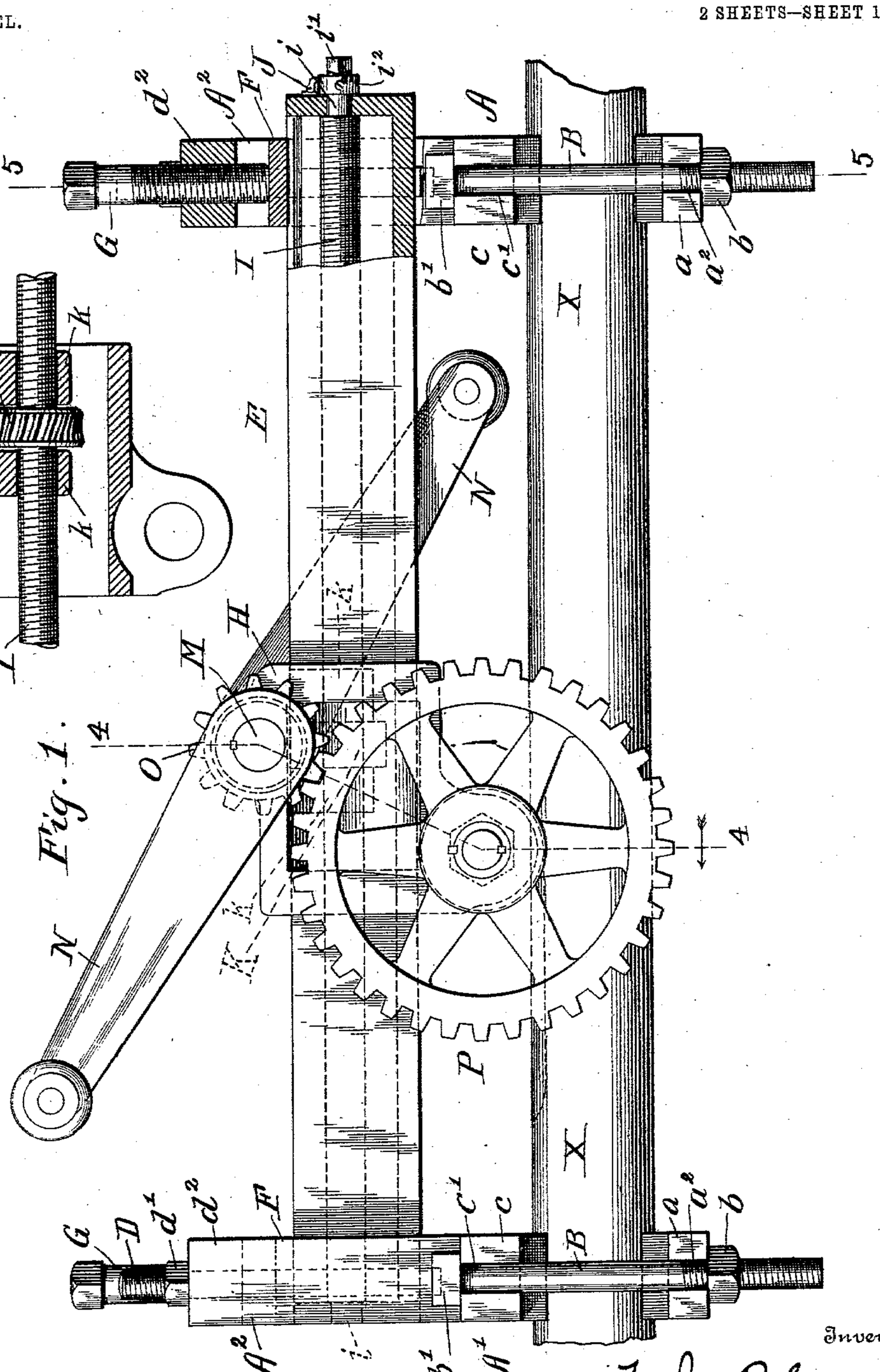

Fig. 2.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 5.

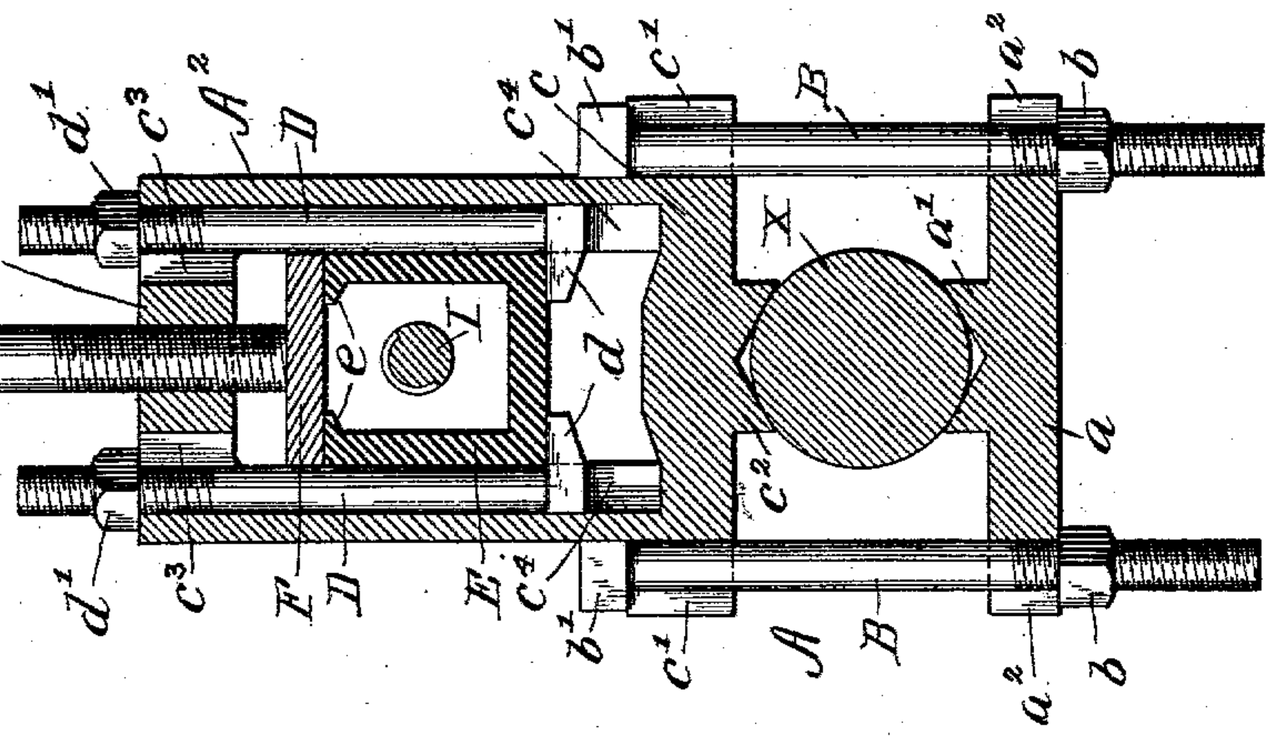

Fig. 4.

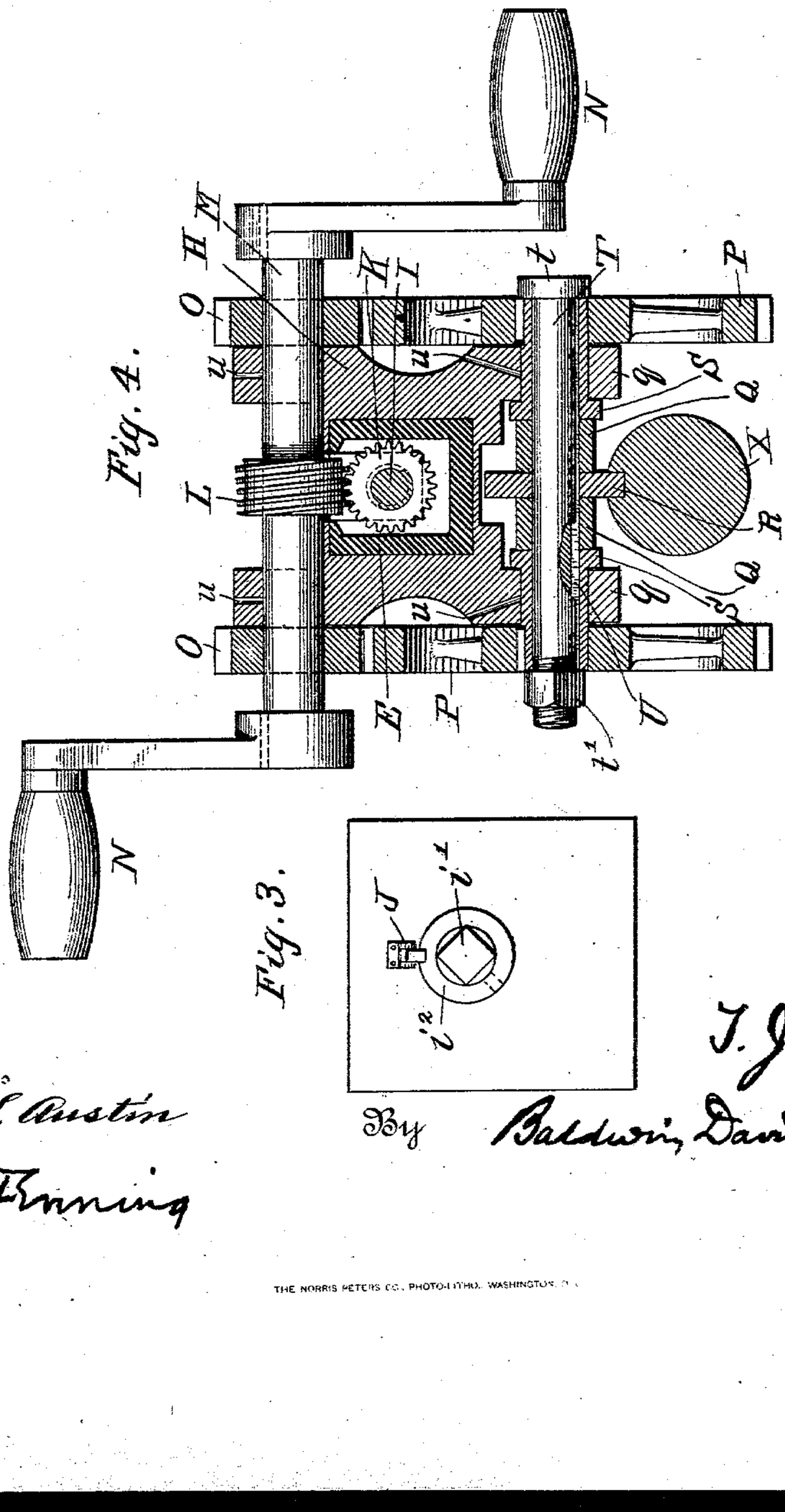

Fig. 3.

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No. 745,414. Patented December 1, 1903.

UNITED STATES PATENT OFFICE.

THOMAS J. BLOSS, OF BOAZ, ALABAMA.

MILLING AND KEY-SEAT-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 745,414, dated December 1, 1903.

Application filed August 10, 1903. Serial No. 168,946. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. BLOSS, a citizen of the United States, residing at Boaz, in the county of Marshall and State of Alabama, have invented certain new and useful Improvements in Milling and Key-Seat-Cutting Machines, of which the following is a specification.

The object of the present invention is to provide a milling or key-seat-cutting machine which while efficient in operation is so simple in construction that it may be readily carried from place to place and may be easily applied to or removed from line-shafting or other objects to be operated upon.

Portable milling or key-seat-cutting machines have heretofore been used; but those that were efficient were complicated and were not, properly speaking, portable and required careful adjustment.

According to my invention the machine is constructed of few parts, which are easily and quickly assembled, applied, and adjusted, so that the operation of milling may commence promptly and continue expeditiously.

In my improved machine two clamps are provided, which are adapted to be secured to a line-shaft without necessarily removing it from its bearings, and these clamps support a main frame, which may be adjusted in the clamps perpendicularly with reference to the longitudinal axis of the shaft. The main frame carries a frame that is adapted to slide longitudinally on it, and this sliding frame is arranged to support the cutter and the mechanism for operating it. The main frame also supports a longitudinal screw-shaft or feed-screw, which, while free at times to turn in suitable bearings, is held against endwise movement, and with this shaft engages a worm-gear which is operated by a worm on a crank-shaft, which latter also actuates the cutter. The worm-gear, while free to turn relatively to the screw-shaft and to move endwise thereon when the latter is stationary, is prevented from moving longitudinally relatively to the sliding frame by suitable stops carried by said frame, so that when the worm-gear is rotated and moved endwise on the screw-shaft the sliding frame is moved longitudinally along the main frame parallel with the longitudinal axis of the line-shaft. The screw-shaft is held stationary at times by means of a latch carried by the main frame and engaging the end of the shaft. This is the case after the milling operation is commenced and the milling-tool is being rotated and moved endwise along the line-shaft to cut the key seat or groove therein.

The milling tool or cutter is attached to a short shaft or arbor, which extends through sleeves mounted in bearings in the sliding cutter-carrying frame and also through the cutter and collars placed on opposite sides thereof between the inner ends of the sleeves. The sleeves, collars, and cutter are all united with the arbor by means of a key or feather, and the parts are held rigidly together by means of a head on one end of the arbor and a nut on the opposite end thereof. The arrangement is such that by removing the nut and withdrawing the arbor the cutter and collars may be quickly separated from the mechanism and a new cutter with properly-sized spacing-washers substituted.

Further details of construction and the particular manner of organizing and operating the mechanism will be hereinafter more particularly specified.

In the accompanying drawings, Figure 1 shows a side elevation of my improved machine applied to a line-shaft. Some of the parts are broken away in order to better illustrate other parts, and some parts are shown by dotted lines. Fig. 2 is a detail view showing particularly the manner in which the worm-gear is supported on the screw-shaft between stops formed on the sliding carriage. Fig. 3 is a detail end view showing particularly the latch which engages the end of the screw-shaft and prevents its rotation. Fig. 4 shows a transverse vertical section of the machine on the line 4 4 of Fig. 1, and Fig. 5 shows a vertical section on the line 5 5 of Fig. 1.

Two clamping devices A A′ are employed at opposite ends of the machine. They are similar in construction in all respects. The lower member of the clamp consists of a cross-piece *a*, having on its upper side between its ends a seat *a′*, which is in the form of a triangular recess and is adapted to receive the shaft

X in the manner indicated in Fig. 5. When a shaft of small diameter is being operated upon, it will enter the seat in the manner indicated in Fig. 5; but when the machine is applied to a shaft of larger diameter the shaft will not enter so deeply into the seat. The opposite ends of the cross-piece *a* are formed with recesses a^2 to receive bolts B, which are headed at *b'*, and screw-threaded at their lower ends and carry nuts *b*. The arrangement is such that the bolts may be moved laterally into the recesses. The upper member of the clamp comprises a cross-piece *c*, having recesses *c'* at opposite ends to receive the upper parts of the bolts B, and this cross-piece has a seat c^2 similar to the seat *a'*, to receive the opposite side of the shaft X. The arrangement is such that the clamp members are self-centering on the shaft no matter what be its diameter. From the cross-piece *c* projects upwardly a frame A^2, which, as shown, is U-shaped and is formed with vertical guides c^4 for the bolts D, which have feet *d* at their lower ends and at their upper ends are screw-threaded and carry nuts *d'*, which are adapted to rest upon the cross-piece of the U-shaped frame. The cross-piece is formed with openings c^3, which are of sufficient area to allow the bolts, with their feet *d*, to be inserted or withdrawn through them; but these openings are narrow, so that the nuts *d'* are properly supported.

The main frame E extends transversely through the U-shaped frames A^2 and rests on the feet *d* of the bolts D. The main frame, as indicated in Figs. 4 and 5, is U-shaped in cross-section—that is to say, it is three-sided, the top being open except for the small longitudinal flanges *e*, which are preferably employed. Near each end the frame E carries a plate F, which rests on the top of the frame E and receives the lower end of an adjusting-screw G, which passes through a threaded opening in the cross-piece d^2. By these devices the mechanism may be applied to a shaft in the manner hereinafter more fully explained.

The main frame carries a sliding frame H, which is preferably of the form shown in the drawings, being constructed to entirely surround the main frame and to support the mechanism which actuates the cutter and moves it longitudinally along the line-shafting.

Arranged longitudinally in the main frame is a screw-shaft I, which has reduced ends *i*, having bearings in the ends of the main frame, the arrangement being such that the screw-shaft may revolve in its bearings, but is prevented from endwise movement therein. At one end the screw-shaft is formed with a squared portion *i'* to receive a wrench or a crank-handle for turning the shaft at certain times. A collar i^2 is secured to this end of the shaft, and this collar is adapted to engage a latch J, pivoted to the adjacent end of the main frame. When this latch engages the collar, the screw-shaft is held stationary. The screw-shaft extends through the sliding frame H and carries a nut K, which, as indicated in Figs. 1 and 2, is arranged between stops *k*. This nut is formed as a worm-gear and engages a worm L, secured to a shaft M, having bearings in the upper portion of the frame H and carrying the crank-handles N on opposite ends. To the shaft M are secured pinions O, which engage larger cog-wheels P, that are keyed to sleeves S, mounted in bearings *q*, forming part of the frame H. The milling tool or cutter R is located between the inner ends of the sleeves, and between the cutter and the sleeves are interposed spacing-washers Q. An arbor T, headed at *t* and carrying a nut *t'*, extends through the sleeves, washers, and cutter and is united thereto by means of a key or feather U in the manner indicated in Fig. 4. When the shaft M is rotated, motion is transmitted, by means of the pinions O, to the cog-wheels P and thence through the sleeves S and shaft T to the milling-cutter R. At the same time the worm-gear K is revolved, and if the screw-shaft I be stationary the worm-gear while turning thereon will also move longitudinally with reference thereto, and thus cause the frame H to be moved longitudinally relatively to the line-shaft and cause the cutter to form a groove lengthwise thereof. The milling-cutter may be removed and replaced with great facility without disturbing other parts of the mechanism. By removing the nut *t'* and withdrawing the arbor T the cutter and spacing-washers may be taken out without disturbing the sleeves S or any other parts of the mechanism, and a new cutter and spacing-washers of proper size may be readily placed in position and secured in place in the manner before explained. The bearings may be lubricated through the openings or oil-holes *u*.

In operation when the machine is applied to line-shafting the clamps A A' are first placed on the shaft, and the frame E is inserted in the clamps, and the latch J is raised, so that the screw-shaft I may revolve freely with the nut or worm-gear K. The operator turns the crank-handles N, which causes the milling-tool to be revolved, while no longitudinal movement is given thereto, (the feed-screw being also revolved.) The bolts D are then lowered by properly manipulating the nuts *d*, and the adjusting-screws G are screwed down, thus not only connecting the frame E rigidly with the clamps, but forcing the cutter down until the desired depth of cut is reached. If necessary, further adjustments are made to bring the frame E exactly parallel with the shaft, and then the latch J is dropped into engagement with the feed-screw and the machine is started to form a longitudinal keyway in the shaft. Inasmuch as the feed-screw is held stationary and the nut or

worm-wheel K revolves on it the frame H will be moved longitudinally on the main frame and the cutter will be fed forward until the desired length of keyway is formed or until it has been fed to the end of the main frame, when the operation is discontinued. Inasmuch as the main frame is open at the top the worm L, which extends through the opening, is free to move from end to end of the frame. If it be desired to cut a keyway in the end of a shaft, both clamps are set back from the end of the shaft, the main frame being allowed to project through them, with the cutter-frame H on its end outside the clamps.

When it is desired to use the machine for doing other work than forming key-seats, it may be clamped directly to the work or to a bench with the work placed beneath it.

It must be obvious from an inspection of the drawings that the mechanism is simple in construction and may be easily separated.

The special construction of the clamps by means of which they are made self-centering is an important feature, as no special care or mechanical knowledge is required to adjust them to the shaft. The manner of connecting the main frame to the clamps is also a desirable feature, inasmuch as the parts may be readily separated for packing or transportation, and yet when assembled may be very rigidly connected.

Another important feature of the invention is the arrangement by which the mechanism for operating the cutter and for feeding it longitudinally is carried by a single frame which is supported by and slides on the main frame. The device for detachably connecting the cutter with the machine is also found very useful in practice, as the cutter may be quickly removed and replaced without disconnecting other parts of the mechanism.

I claim as my invention—

1. The combination of two clamps adapted to be rigidly attached to a shaft, a main frame, means for rigidly connecting the main frame with the clamps and for adjusting it vertically and longitudinally therein, a frame adapted to slide on the main frame, a cutter carried thereby, and means for rotating the cutter and moving it longitudinally relatively to the main frame.

2. The combination of the clamps each comprising two members having self-centering seats, a main frame extending through the clamps, bolts having feet supporting the frame in the clamps, adjusting-screws for clamping the main frame against the feet of said bolts, clamping-bolts connecting the members of the clamps, and a cutter supported by and movable longitudinally relatively to the main frame.

3. The combination of clamping devices, a main frame supported thereby and adjustable vertically and longitudinally therein, a feed-screw carried by the main frame, a frame embracing the main frame and sliding longitudinally on it, a worm-gear on the feed-screw held against longitudinal movement relative to the sliding frame, means for rotating said worm-gear, a cutter and means carried by the sliding frame for operating the cutter.

4. In a milling-machine the combination of a cutter-carrying frame, an operating-shaft thereon, sleeves supported in bearings in the cutter-carrying frame and geared to the operating-shaft, a rotary cutter between the sleeves and an arbor extending through the sleeves and cutter supporting the latter and detachably connected therewith and with the sleeves whereby when the arbor is withdrawn the cutter may be removed without detaching the sleeves.

5. In a milling-machine the combination of a cutter-carrying frame, an operating-shaft thereon, sleeves supported in bearings in the cutter-carrying frame and geared to the operating-shaft, a rotary cutter between the sleeves, spacing-collars on opposite sides of the cutter and an arbor extending through the sleeves, cutter and collars, supporting the cutter and detachably connected with the cutter, collars and sleeves whereby when the arbor is withdrawn the cutter and collars may be removed without detaching the sleeves.

6. The combination of the three-sided main frame open at the top, means for attaching said main frame to a shaft, a sliding frame mounted on said main frame and formed with bearings above the main frame for an operating-shaft and with down-hangers below the main frame having bearings for a cutter-shaft, operating and cutter shafts arranged in such bearings respectively, a feed-screw mounted within the main frame, a cutter actuated by the operating-shaft, a nut on the screw-shaft, and a gear-wheel on the operating-shaft arranged between its bearings and extending through the opening of the main frame and engaging the nut on the screw-shaft.

7. The combination of the main frame, a sliding frame thereon, an operating-shaft carried by the sliding frame, a cutter supported on the sliding frame and geared to said operating-shaft, a screw mounted in the main frame, a nut thereon within the sliding frame and actuated by the operating-shaft, clamps at opposite ends of the main frame for attaching the mechanism to a shaft, a U-shaped frame extending upwardly from each set of clamps and through which the main frame extends, bolts having feet supporting the main frame in the U-shaped frames, nuts for raising and lowering said bolts, plates resting on the top of the main frame and screws carried by the U-shaped frames and engaging said plates.

8. The combination of two clamps, a main frame, means for connecting the main frame with the clamps, a sliding frame on the main

frame, an operating-shaft carried thereby, a cutter carried by the sliding frame and actuated from said shaft, a feed-screw adapted to turn freely in the main frame, a nut on the feed-screw geared with the operating-shaft, and a latch for at times holding the feed-screw stationary.

In testimony whereof I have hereunto subscribed my name.

THOMAS J. BLOSS.

Witnesses:
R. B. THOMPSON,
G. M. E. MANN.