(No Model.) 3 Sheets—Sheet 1.

W. J. MUNCASTER.

MACHINE FOR BORING CYLINDERS.

No. 326,049. Patented Sept. 8, 1885.

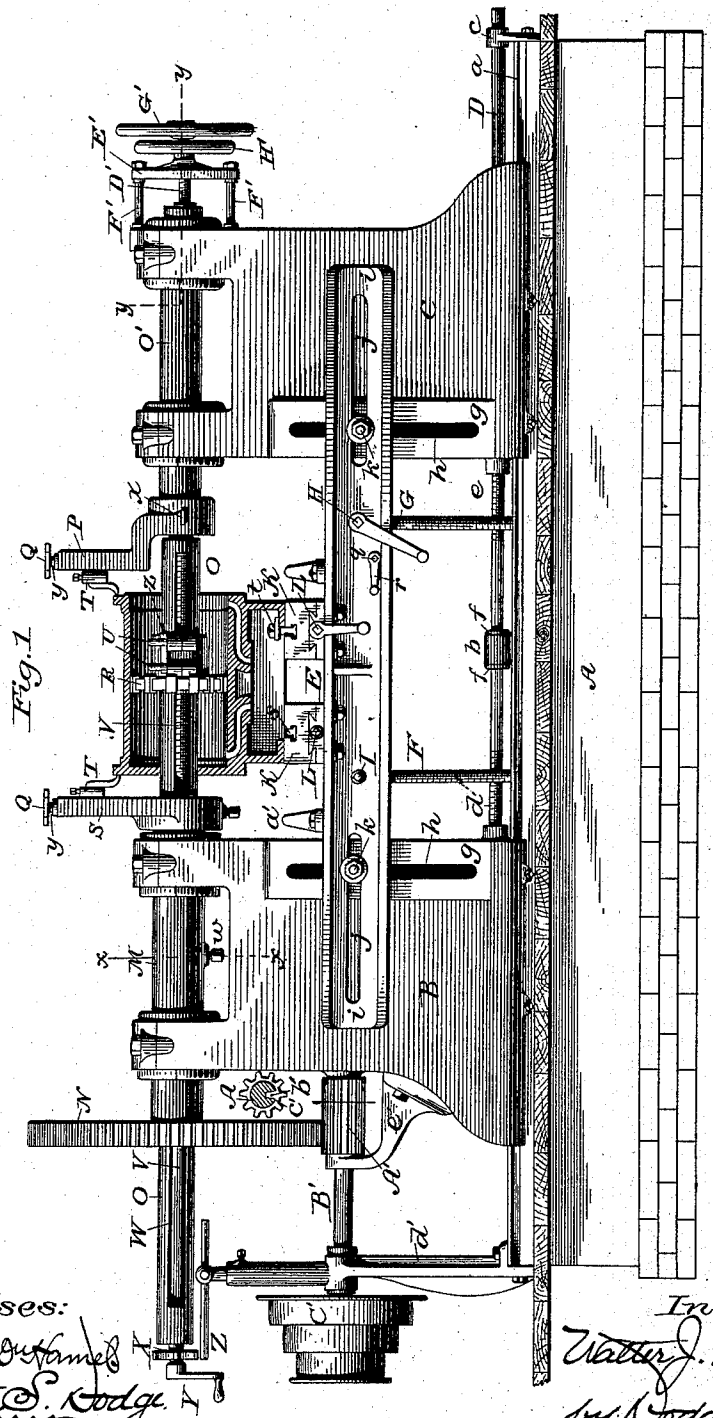


Fig. 1

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(No Model.) 3 Sheets—Sheet 2.

W. J. MUNCASTER.

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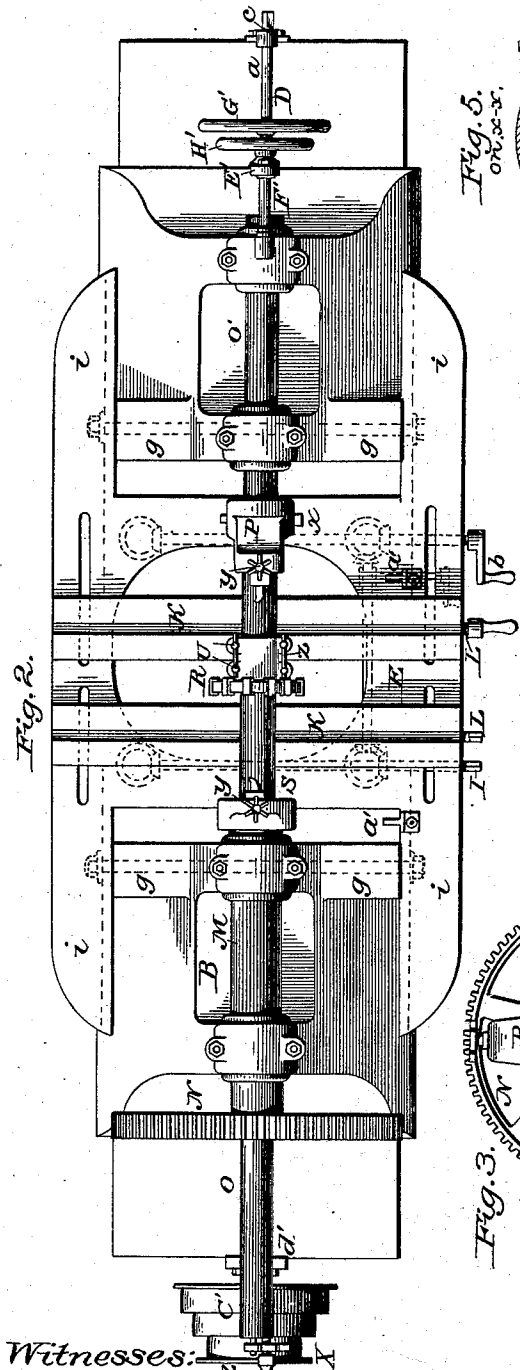


Fig. 2.

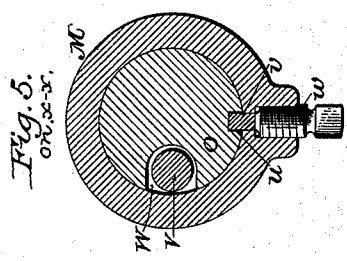


Fig. 5.

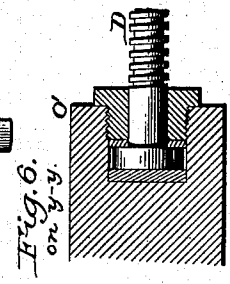


Fig. 6.

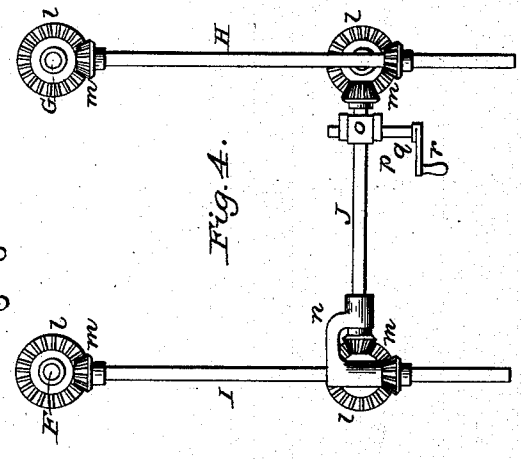


Fig. 4.

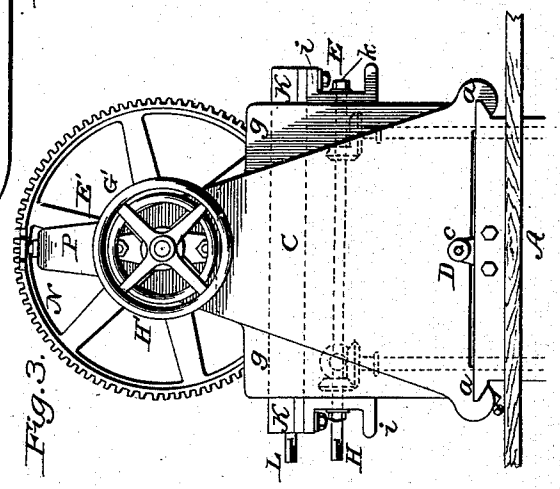


Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

W. J. MUNCASTER.

MACHINE FOR BORING CYLINDERS.

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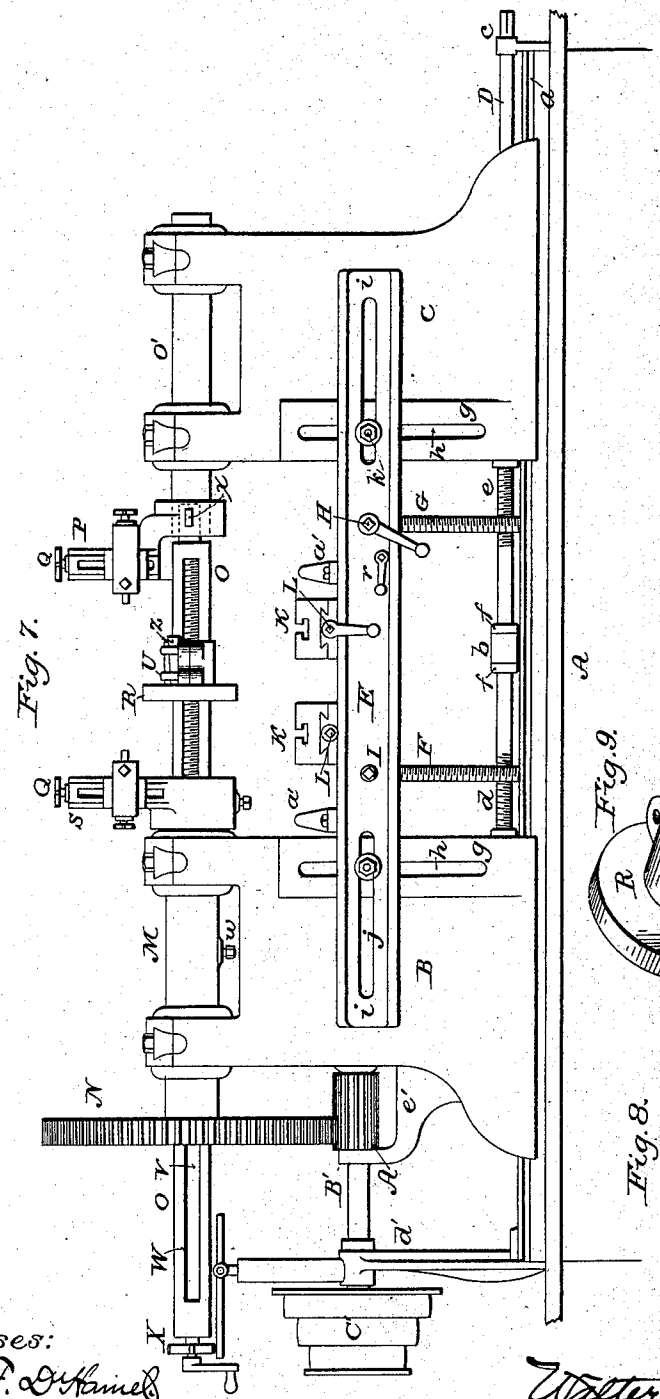


Fig. 7.

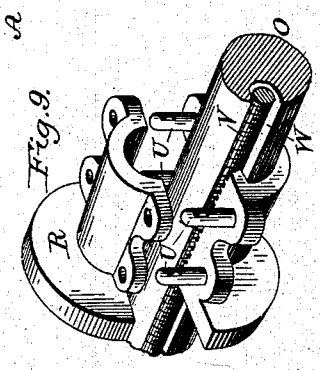


Fig. 9.

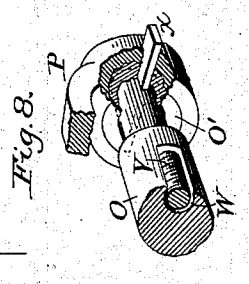


Fig. 8.

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UNITED STATES PATENT OFFICE.

WALTER J. MUNCASTER, OF CUMBERLAND, MARYLAND, ASSIGNOR OF ONE-HALF TO MERWIN McKAIG, OF SAME PLACE.

MACHINE FOR BORING CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 326,049, dated September 8, 1885.

Application filed April 23, 1885. (No model.)

To all whom it may concern:

Be it known that I, WALTER J. MUNCASTER, of Cumberland, in the county of Allegany and State of Maryland, have invented certain new and useful Improvements in Machines for Boring Cylinders, of which the following is a specification.

My invention relates to lathes or machines for boring, dressing, and finishing engine and pump cylinders; and it consists in various features and details of construction hereinafter explained, by which the speedy and accurate adjustment of the cylinder is accomplished preparatory to the operations mentioned.

It further relates to the manner of and devices for feeding the cutting-tools along.

Figure 1 of the drawings is a front elevation of the machine, showing a cylinder in section, in position to be operated upon; Fig. 2, a top plan view; Fig. 3, an end elevation; Figs. 4, 5, 6, 8, and 9 detail views of parts hereinafter referred to, and Fig. 7 a view showing a modification of the machine.

Prior to this invention much difficulty has been experienced in boring, dressing, and finishing cylinders, and a great deal of time has been required to adjust the cylinder preparatory to performing the operations named. The dressing or finishing of the ends has hitherto been performed as a separate and independent operation, requiring additional time and labor and involving additional expense.

My invention obviates the difficulties heretofore encountered, and enables me to accomplish the work easily, quickly, and in a thorough manner.

The construction of the machine will be readily understood in connection with the drawings and the following description.

A indicates a firm and substantial base, preferably set in masonry, and formed with longitudinal guiding ribs or ways *a*.

B and C indicate two heads or stocks mounted upon the base A, and guided by the ribs or ways *a*, the heads being movable lengthwise of the bed.

D indicates a screw-shaft journaled in suitable supports, *b c*, on the base A, and having right and left threaded portions *d* and *e*, which enter correspondingly-threaded holes in the heads or stocks B C, and serve to move the heads toward or away from each other as the shaft D is rotated in one or the other direction. The end of the shaft is squared to receive a crank or handle by which to turn it, and is held against longitudinal movement by collars or bosses *f* at both sides of the support *b*. The screw-shaft D serves also to hold the heads rigidly in any position to which they may be adjusted. Each head B C is formed near its inner end with vertical faces *g* on the front and rear sides, and these faces are furnished with vertical slots *h*, for a purpose that will presently appear.

E indicates a vertically-adjustable bed or table having horizontal arms *i*, which extend along the front and rear faces of the heads or stocks B and C, bearing against and guided by the upright faces *g*. These arms *i* are formed with longitudinal slots *j*, through which bolts *k* pass into the vertical slots *h*, said bolts serving to hold the bed or table E at any required vertical adjustment, and also to bind the heads or stocks and the table or bed firmly together to prevent play or vibration while the machine is in operation.

The table E is further supported by four vertical screw-stems, F F and G G, journaled or swiveled in the table and screwing into threaded sockets in the base, and by turning these screws the bed may be raised or lowered, as required, when the bolts *k* are loosened. Ordinarily it is desired that all these screws be turned simultaneously and equally, in order to raise the bed bodily without inclining or tipping it, and for this purpose I provide each screw with a bevel gear or pinion, *l*, and connect the several stems by shafts H, I, and J, each carrying two bevel-pinions, *m*. The shafts H and I are journaled in the bed E, and have their front ends extended outward in front thereof and squared to receive a crank or handle by which to rotate them. The cross-shaft J connects the gear of one of the screws F F with that of one of the screws G G, while the shafts H I connect the two screws of each pair, as illustrated in Fig. 4.

The cross-shaft J is carried at one end in a pivoted block or support, *n*, hung upon the shaft I, and is supported at its other end by a vertically-movable block, *o*, resting at its

lower end upon an eccentric, *p*, carried by a short shaft, *q*, the end of which projects outward beyond the front of the bed E, and is furnished with a crank or handle, *r*. Thus arranged the shaft I may be raised and lowered, and the screws F and G caused to act independently or in unison, as required. This is an important provision, because it often happens that the form of the cylinder and its attendant parts necessitates the raising and lowering of one end of the bed or table independently of the other.

Upon the bed or table E are mounted two cross-slides, K, Figs. 1 and 2, each provided with a traversing screw, L, for moving it across the bed or table, and each formed with a T slot or groove, *s*, to receive bolts *t* by which to fasten the cylinder upon the slides.

As shown in Figs. 1 and 2, the head or stock B is furnished with a hollow arbor or spindle, M, upon which is secured a large gear-wheel, N.

Through the hollow arbor or spindle a boring bar or shaft, O, passes, said bar or shaft having a key-seat, *u*, planed in it from end to end to permit the bar to slide lengthwise through the arbor and over a key, *v*, seated in said key-seat and in the hollow arbor and pressed firmly into the seat or loosened, as required, by a set-screw, *w*.

The boring-bar or tool-shaft O has a tenon formed on its end to enter a socket in a second bar or shaft, O′, journaled in the head or stock C and forming a continuation of bar O, a transverse key or pin, *x*, passing through the two and locking them firmly together, as shown in Figs. 1, 2, and 8. The same key serves to secure upon the shaft a radial arm or feed-stock, P, containing a feed-screw, *y*, having a star-wheel, Q, at its outer end and a tool-post, T, moved by said screw. The arm P is offset from its hub or collar, which encircles the shaft, to permit the hub or boss of the boring-tool R to pass beneath it.

S indicates a second radial feed stock or arm, also provided with a feed screw, *y*, having a star-wheel, Q, at its outer end, and with a tool post or holder moved by the screw.

The boring head or tool R is divided in a plane parallel with the axis of the boring bar or shaft into two sections, which are drawn and held together by wedges or keys *z*, passing through eyebolts U projecting from one section through ears formed on the other, as shown in Figs. 1 and 9.

The boring tool or head R is moved lengthwise upon the bar or shaft O by a screw, V, seated and journaled in a groove, W, therein, and projecting beyond the outer end of the bar or shaft, where it is furnished with a star-wheel, X, and crank or handle Y. The star-wheel X of screw V is given a partial rotation at each revolution of the boring bar or shaft by engagement with a stationary arm or stop, Z, placed in its path. The screw V and its star-wheel X being eccentric to the boring bar or shaft, said star-wheel will encounter the stop Z during a small portion of each revolution, the period being lengthened or shortened by setting the stop nearer to or further from the axis of the wheels. In like manner the set screws *y y* of the cross-feed stock P and S are given a slight turn at each revolution of the boring bar or shaft by the engagement of their star-wheels Q with fixed stops *a′* on the bed or table E.

The stops *a′* and Z require setting or adjustment for each different size of cylinder and to suit the work to be performed on each.

Motion is imparted to the boring bar, through gear-wheel N, from an elongated pinion, A′, having a rib or spline, *b′*, to enter the groove *c′* of the shaft B′, upon which the pinion is mounted. The shaft B′ passes through an upright or standard, *d′*, bolted to the bed or base A, and is held against end play by a collar at one end of said standard and by a pulley or cone, C′, at the other side thereof, or in any other usual manner. The shaft also passes through an arm or bracket, *e′*, bolted or otherwise made fast to the head or stock B and extending outward beyond the pinion, and finally passes through a hole or opening in the stock or head, so that as the stock or head is moved along the base the pinion is carried with it, but the shaft is not moved.

The purpose of elongating the pinion A′ is to permit the gear-wheel N to move back and forth a limited distance without becoming disconnected from or out of mesh with the pinion; and this movement is for the purpose of permitting the boring-bar (which is locked to the hollow arbor or spindle M while the machine is operating) to be moved lengthwise while rotating to dress off the periphery of the cylinder ends. To effect this longitudinal movement of the boring bar or shaft I employ a screw, D′, the end of which is swiveled in the outer end of section O′ of the boring bar or shaft, and the body of which passes through a threaded hole in a cross-head, E, held by posts or rods F′ at a distance from the end of shaft O′.

The screw is furnished with a hand-wheel, G′, by which to turn it, and with a jam-nut, H′, also in the form of a hand-wheel, by which to lock the screw against being turned by the rotation of the boring bar or shaft.

The manner of adjusting and operating the machine is as follows: The bolts *k* are loosened, and the shaft D is turned to move the heads B C to the proper distance apart. The set-screws *w* are loosened, the pin *x* is driven out, and the boring bar or shaft O is withdrawn through the hollow spindle M until its end is flush with the face of cross-feed arm S, or nearly so. The cylinder to be bored is then placed upon the slides K and loosely secured thereto by the fastening-bolts, the table or bed E is raised horizontally in line with the axis of the boring bar or shaft O, and the slides K are moved to bring said axis vertically in line. When thus brought into position the cylinder is firmly clamped upon the

slides, and is then ready for boring, dressing, and finishing. The boring-shaft O is then run forward to the section O′, and the key *x* is inserted to lock the two sections together. The boring tool or cutter is secured upon the boring bar or shaft, the cross-head S is moved up to the end of the cylinder, and the set-screws *w* and *e′* are tightened. The machine is then set in motion, and at each revolution of the boring-bar the cutting-tools are advanced a given distance until the work of boring and of facing the ends is completed.

To dress the periphery of the cylinder ends, the tools of arms P and S are set at the required distance from the axis of the boring bar or shaft, and as the shaft rotates it is moved lengthwise by screw D′, controlled by hand-wheel G′, until the operation is completed.

The cross-feeds P and S may either or both be formed with two or more arms, each carrying a different kind of tool or tools differently adjusted, so that the operations of roughing and dressing, or roughing, dressing, and finishing, may be simultaneously performed.

With the machine constructed and operating as thus set forth, work may be performed rapidly and with great accuracy.

One head only may be made movable, if desired, but it is preferred to make both adjustable.

It is not essential that the sliding or independent section O′ of the boring bar or shaft be provided, as the same result may obviously be secured by making the tool-carrying arms P and S adjustable by means of a screw or other feed device in line with the axis of the boring-bar, as indicated in Fig. 7.

Having thus described my invention, what I claim is—

1. In a cylinder boring or dressing machine, the combination of base A, heads B C, vertically-adjustable table E, longitudinally-movable bar O, and cutter R, carried by said bar.

2. In a machine for boring cylinders, the combination of a vertically-adjustable table, E, slides K K, adjustable transversely upon said table, heads B C, one or both adjustable relatively to the table, a boring arbor or shaft, O, mounted in and longitudinally adjustable through the head or stock, and a boring head or tool secured to said shaft or bar.

3. The combination, substantially as described and shown, of base A, heads B C, provided with slots *h*, screw-shaft D, having right and left threaded portions *d e*, bed or table E, provided with slots *j*, bolts *k*, passing through slots *h* and *j*, hollow arbor M, carried by head or stock B, and provided with gear-wheel N, boring-bar O O′, cutter R, shaft B′, and pinion A′.

4. In combination with base A, heads or stocks B C, and boring bar or shaft O O′, screw-shaft D, adapted and arranged to advance and recede the heads, substantially as set forth.

5. In combination with base A and heads B C, boring arbor or shaft O O′, and vertically-adjustable table E.

6. In combination with base A, heads B C, provided with slots *h*, table E, provided with arms *i*, extending along the sides of the heads and provided with slots *j*, and bolts *k*, passing through the slots and serving to bind the heads and bed or table together.

7. In combination with base A, heads B C, and boring-bar O, bed or table E and adjusting-screws F G for said table.

8. In combination with base A, heads B C, and boring-bar O, table E, vertical screws F G, provided with pinions *l*, and shafts H I J, provided with pinions *m*, all substantially as described and shown.

9. In combination with heads B C and a boring-shaft carried thereby, a vertically-movable table, and screws F G at each end of said table, adapted to be turned simultaneously or independently to raise the table bodily or at one end only.

10. In combination with heads B C, and with a boring-bar carried thereby, table or bed E, right and left screws F and G, provided with pinions *l*, cross-shafts H I, provided with pinions *m*, connecting the screws F G, pivoted at one end and carried in an adjustable block, *o*, at the other end, and an eccentric, *p*, for raising and lowering said block.

11. In combination with base A and heads or stocks B C, the stock B, adjustable upon the base, hollow arbor or spindle M, carried by head B and provided with gear M, boring-bar O, passing through said arbor or spindle, standard *d′*, mounted upon base A, grooved shaft B′, journaled in said standard and extending into head B, pinion A′, provided with a rib to enter the grooved shaft B′, upon which it is mounted, and arm *e′*, attached to head B and serving to move pinion A′ as the head is moved.

12. In a cylinder-boring machine, the combination of a base, heads mounted upon said base, and a boring-bar made in two sections, one section mounted in each head and one adapted to slide through the head in which it is mounted, whereby the boring-bar may be withdrawn to permit the placing of a cylinder between the heads.

13. In combination with base A and heads B C, a boring-bar composed of sections O O′, one provided with a tenon and the other with a socket to receive the tenon, and a pin or key passing through the interlocking ends and serving to unite them, as set forth.

14. In combination with heads B C, boring-bar O and cross-feed arm S, secured to the boring-bar, as and for the purpose set forth.

15. In combination with heads B C, boring-bar O O′, provided with boring-head R, and with cross-feed arm P offset to permit the hub of the cutter to pass under it.

16. In combination with heads B C, hollow arbor or spindle M, mounted in head B, boring-bar O, provided with groove or key-seat *u*, key *v*, seated in said groove and in the hollow arbor, and set-screw *w*, bearing upon said key, substantially as shown.

17. In combination with heads B C, boring-bar O, provided with groove W, screw V, seated in said groove, and boring tool or head R, mounted upon the boring-bar and engaged with the screw, substantially as described and shown.

18. In combination with heads B C and boring-bar O, divided cutter or boring-head R.

19. In combination with heads B C, boring-bar O, feed-screw V, seated in said bar and provided with star-wheel X, boring-head or cutter R, mounted upon the bar O and engaged with the screw, and stop Z, located in the path of star-wheel X and adapted to partially rotate the same at each revolution of the boring bar.

20. In combination with heads B C and table or bed E, boring-bar O, a radial arm mounted in said bar and provided with a movable tool post or holder, a feed-screw, *y*, for moving said tool-holder, a star-wheel fixed upon said screw, and a stop, *a'*, placed in the path of the star-wheel and serving to turn the wheel and screw as the radial arm moves past it.

21. In combination with base A, heads B C, and elongated pinion A' carried by head B, hollow arbor M, journaled in head B and provided with gear-wheel N, boring-bar O, passing through arbor M, extension O', mounted and arranged to rotate and slide in head C', screw D', swiveled in the end of extension O', and a radial tool-carrying arm secured upon the boring-bar, all substantially as described and shown.

22. In combination with heads B C, hollow arbor M, and boring-bar O, provided with a radial tool-carrying arm, means, substantially such as described and shown, for imparting a longitudinal reciprocation to the boring-bar while the same is rotating.

23. In combination with heads B C and table E, boring-bar O, provided with tool-carrying arms P S, having tool posts or supports, and tools adapted to be adjusted in line with the axis of the boring-bar.

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