

March 5, 1929.

R. S. BROWN ET AL

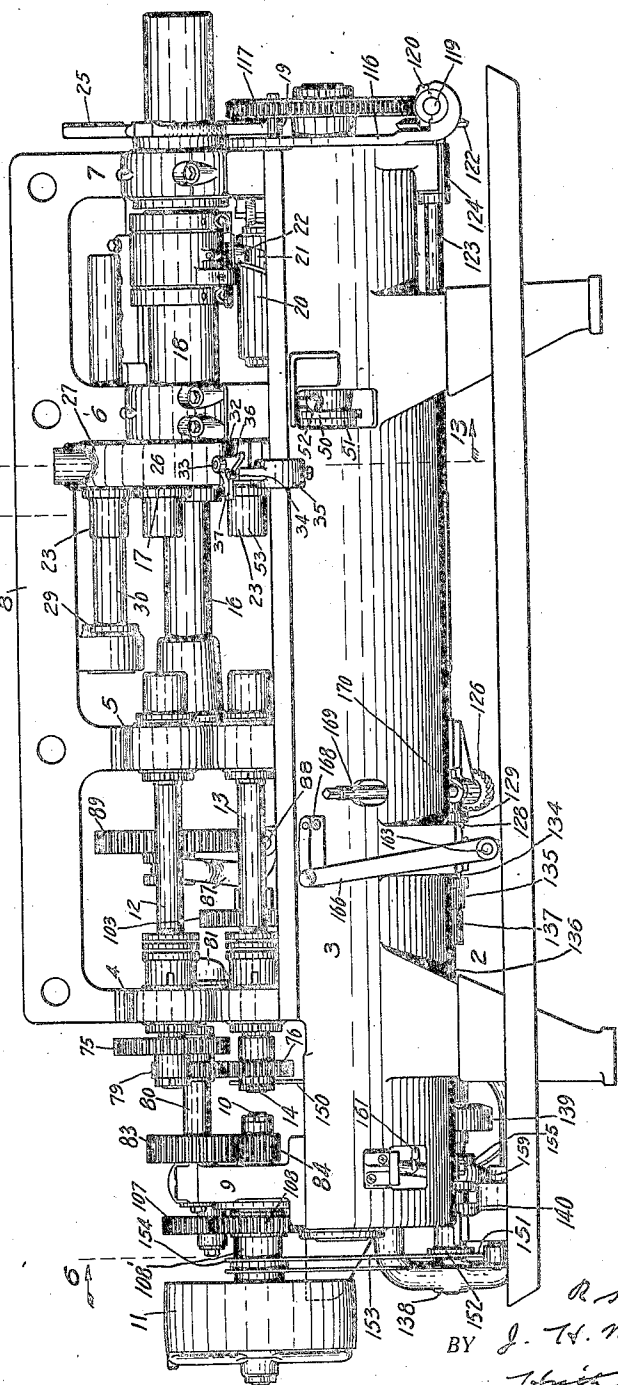
1,704,032

METAL WORKING MACHINE

Filed July 18, 1924

6 Sheets-Sheet 1

FIG. 1.



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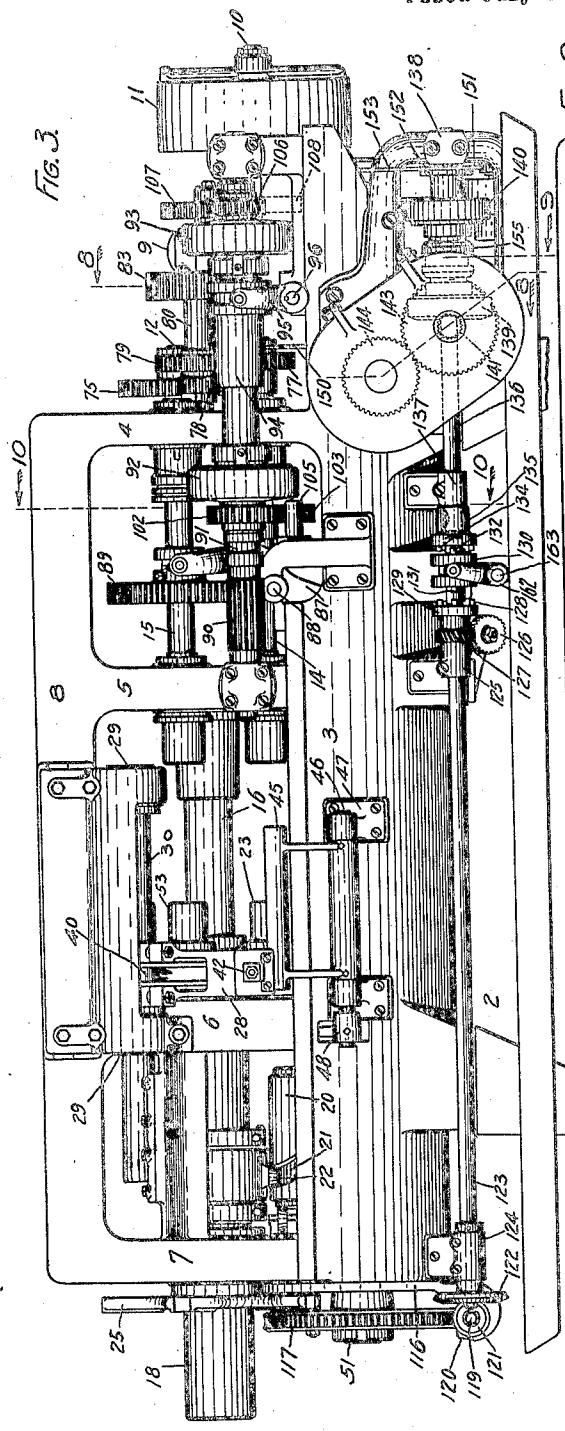
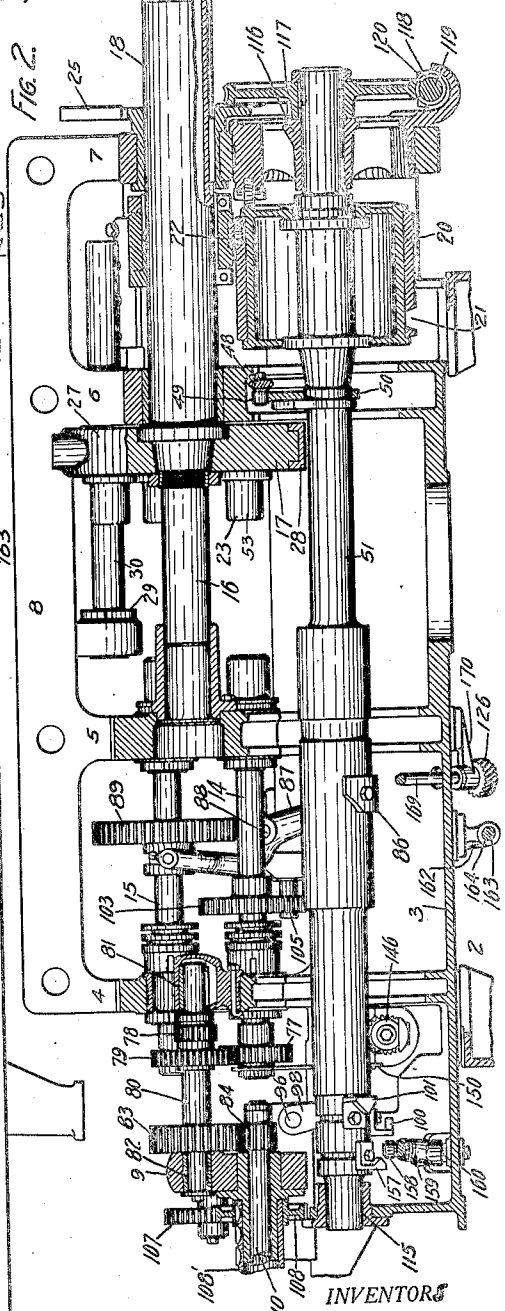
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1,704,032

METAL WORKING MACHINE

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6 Sheets-Sheet 2



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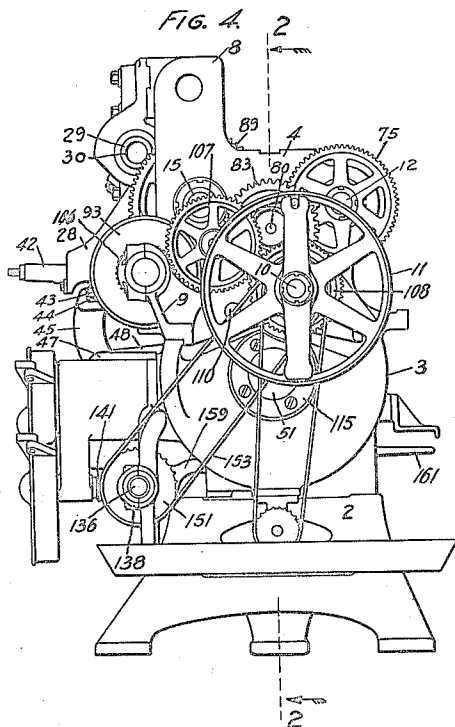
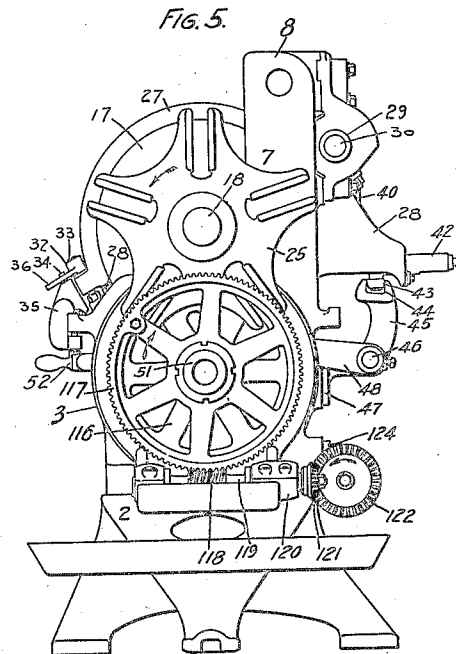
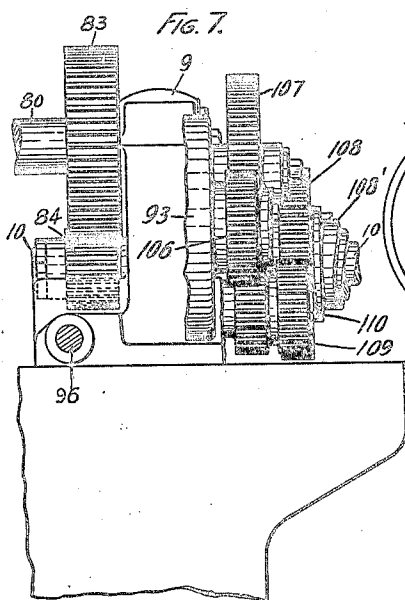
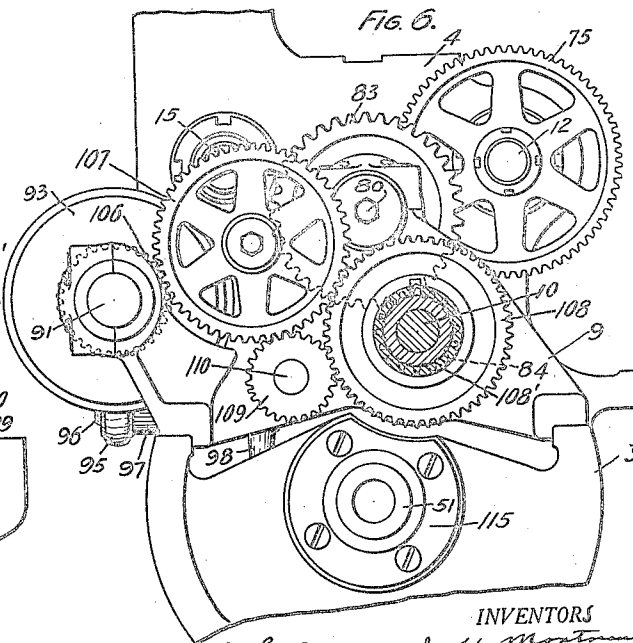
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METAL WORKING MACHINE

Filed July 18, 1924

6 Sheets-Sheet 3



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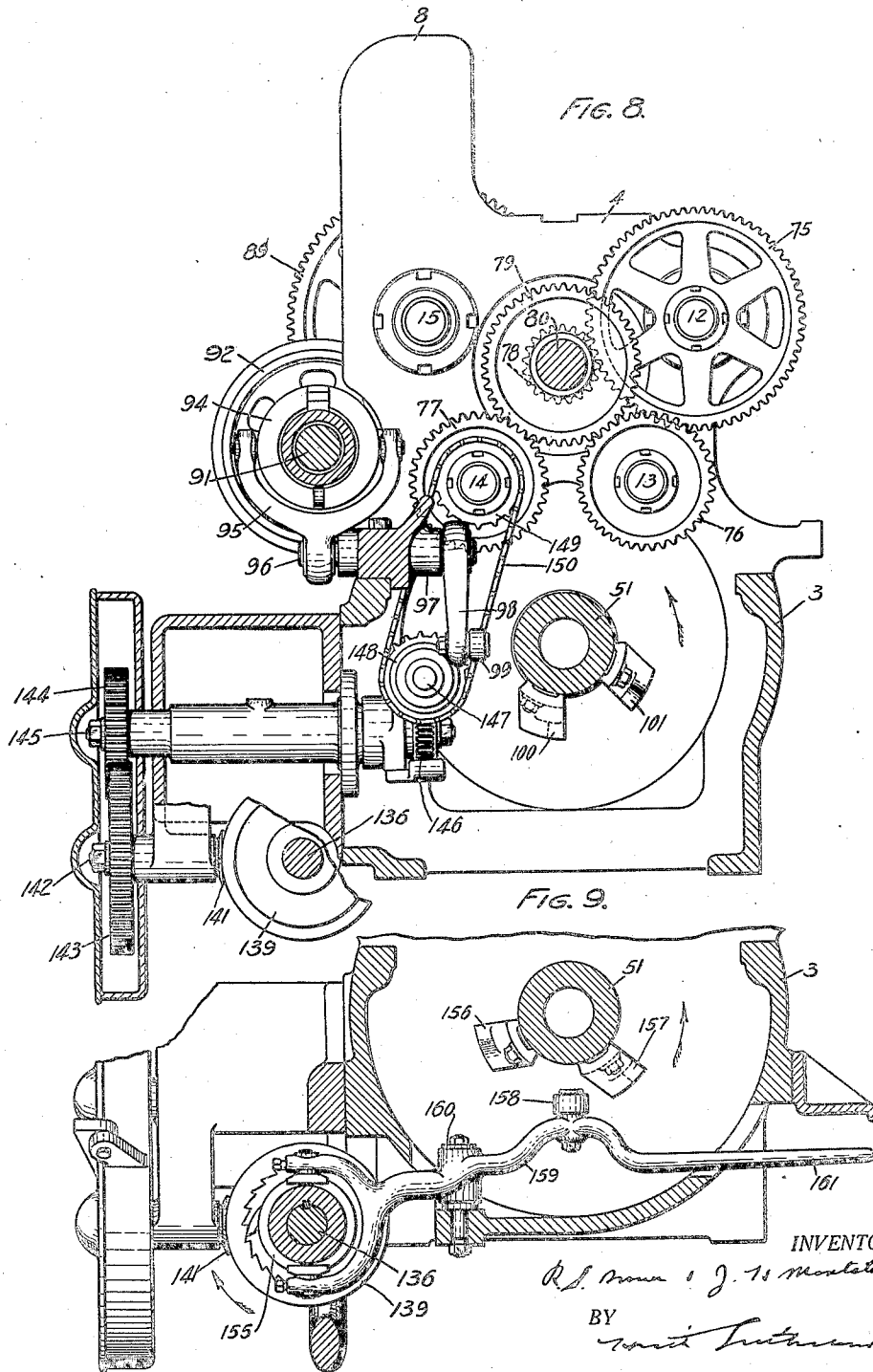
R. S. BROWN ET AL

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METAL WORKING MACHINE

Filed July 18, 1924

6 Sheets-Sheet 4



March 5, 1929.

R. S. BROWN ET AL

1,704,032

METAL WORKING MACHINE

Filed July 18, 1924

6 Sheets-Sheet 5

FIG. 10.

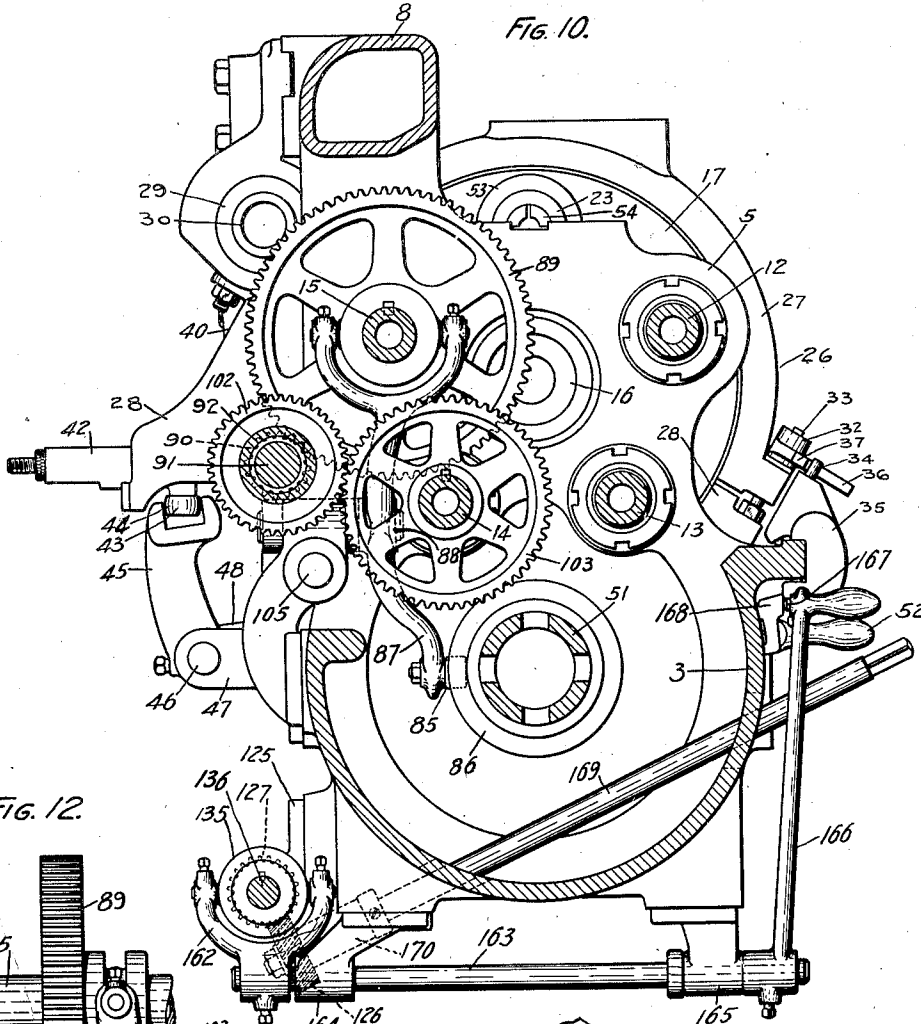


FIG. 12.

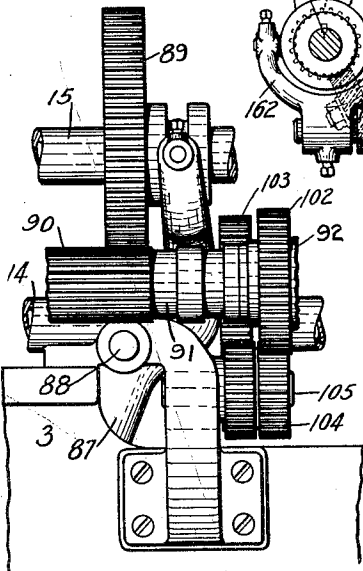
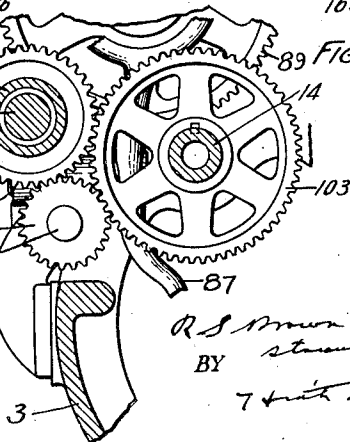


FIG. 11.



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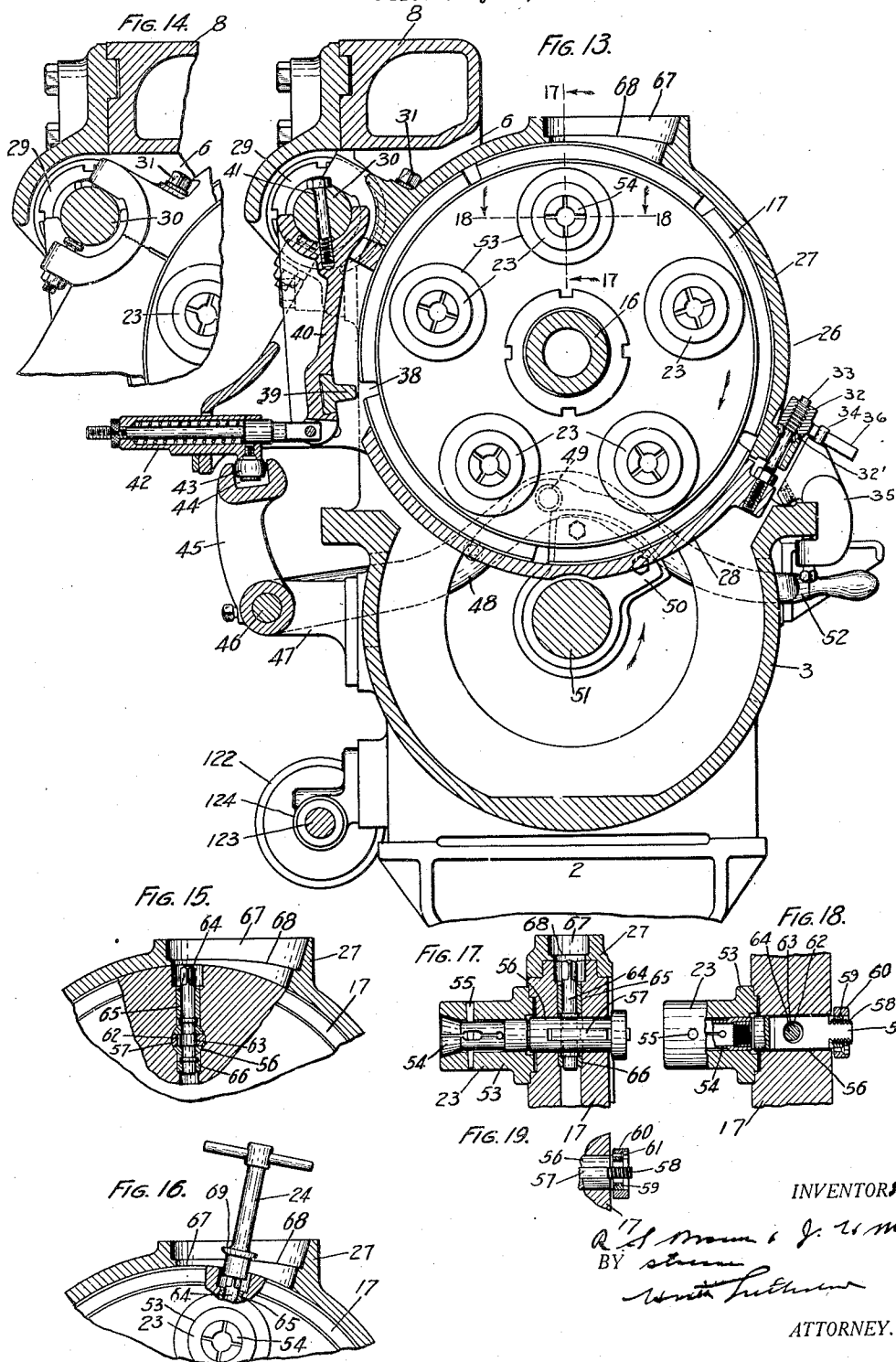
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R. S. BROWN ET AL
METAL WORKING MACHINE

1,704,032

Filed July 18, 1924

6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE.

ROBERT S. BROWN, OF NEW BRITAIN, AND JOHN H. MONTSTREAM, OF HARTFORD, CONNECTICUT, ASSIGNORS TO NEW BRITAIN MACHINE COMPANY, OF NEW BRITAIN, CONNECTICUT, A CORPORATION OF CONNECTICUT.

METAL-WORKING MACHINE.

Application filed July 18, 1924. Serial No. 726,720.

Our invention relates to metal working machines and while the improvements are capable of incorporation in machines of various kinds, whether working in metal or wood or other material, we have, nevertheless, in the drawings accompanying and forming part of the present specification, shown an advantageous form of embodiment of the invention which, to enable those skilled in the art to practice the same, will be set forth fully in the following description. We are not restricted in any sense to this showing, yet the specific form of apparatus shown is recognized as a multiple spindle chucking machine in which a series of work holding chucks in a turret are so related to a series of rotary tool holding spindles that the work held by different chucks is presented in succession to each of the cutting tools by the successive indexing and feeding movements of the chuck carrying turret.

While we have a number of objects in view, one is the provision of a machine or apparatus capable of performing extremely fine accurate work by preserving accuracy of relation of the parts carrying the work and the tools.

A further object is to provide for such a variety of speeds and rates of feed as may be necessary to produce varying sizes of work at the requisite and maximum speed without revolving the work and independently of the size of the piece being operated upon.

A further object is to incorporate a number of features for facilitating its set up and adjustment on new jobs.

A further object of the invention is to provide a simple scheme of holding the work securely and locking or releasing it with safety to the operator or attendant.

In general, the object is to improve certain features of a machine of the character indicated, as will more fully hereinafter appear.

Referring to said drawings:

Fig. 1 is a front elevation of the machine. Fig. 2 is a longitudinal section substantially on the line 2—2 of Fig. 4 looking in the direction of the arrows.

Fig. 3 is a rear elevation of such machine.

Fig. 4 is an end view as seen from the left in Fig. 1.

Fig. 5 is an end view looking from the right in said Fig. 1.

Fig. 6 is an enlarged sectional view on the line 6 of Fig. 1.

Fig. 7 is a partial view as looking from the left in Fig. 6 with portions broken away.

Fig. 8 is a sectional view substantially on the line 8—8 of Fig. 3, looking in the direction of the arrows and upon a larger scale.

Fig. 9 is an enlarged sectional view on the line 9 of Fig. 3 looking in the direction of the arrows.

Fig. 10 is a cross section on the line 10—10 of said Fig. 3, looking in the direction of the arrows.

Fig. 11 is a partial view similar to Fig. 10, but with addition of an intermediate gear.

Fig. 12 is a view of the structure represented in said Fig. 11 as seen from the left.

Fig. 13 is a section substantially on the line 13—13 of Fig. 1, looking in the direction of the arrows and with the scale enlarged.

Fig. 14 is a partial enlarged sectional view substantially on the line 14 of said Fig. 1, looking in the direction of the arrows.

Fig. 15 is a detail view somewhat similar to Fig. 13 and with portions broken away.

Fig. 16 is a detail somewhat like Fig. 15 and with turret partially indexed.

Fig. 17 is a sectional view on the line 17—17 of Fig. 13 looking in the direction of the arrows.

Fig. 18 is a sectional horizontal view on the line 18—18 of said Fig. 13, as viewed in the direction of the arrows.

Fig. 19 is a fragmentary detail of part of said Fig. 17 with certain portions broken away.

Like characters refer to like parts throughout the several views which are, as noted, on different scales.

The operative parts of the machine are carried by a suitable frame work, such as that denoted in a general way by 2, and represented somewhat fully in the various views and especially in Figs. 1 to 5 inclusive.

As shown the framing involves in its make-up a bed or table, such as 3, and which involves a channeled open-work tubular construction furnished with a top, the top sustaining at different points in its length up-

rights or bearings, such as 4, 5, 6 and 7, two of which have caps screwed, bolted or otherwise secured to the uprights 6 and 7 and which are connected at their upper ends by a stringer, such as 8. The bed, uprights and stringer are all rigidly connected or cast integrally with each other, thus providing a very strong rigid frame or bed.

The body portion of the bed or table 3 supports at an end a bearing or block, such as 9, which sustains a shaft, as 10, which carries a pulley, as 11, Fig. 1, and which in the showing made constitutes the main driver of the different operative parts of the machine and which in turn may be driven by a belt or other means not shown.

The bearings or uprights 4 and 5, as shown, sustain means, preferably tool spindles, such as 12, 13, 14 and 15. These tool spindles receive their motion from gears which will be hereinafter set forth.

As shown, the bearing in the upright 5 supports the extension 16 which projects centrally from the turret 17. The turret 17 has projecting oppositely from it the larger extension 18 which is sustained by the uprights 6 and 7, all as shown in Fig. 1. The turret 17, in the form shown is advanced or moved toward the left in Fig. 1 and retracted toward the right by a cam 20 (Fig. 2). This cam has on its periphery a cam path, as 21, as shown also in Figs. 2 and 3, and which for the purpose set forth engages the roller 22 to reciprocate the extension 18 and thus the turret 17. As shown the turret 17 has on its face a series of chucks, as 23, of which as represented there are five, although the number may be varied. As shown, the axes of a number of the chucks (four as shown) are co-axial with the tool spindles 12, 13, 14 and 15, in view of which condition a chuck is always left available for the insertion of work and its removal.

Each chuck 23, as shown, is operable by a key, as 24, represented in Fig. 16 and described later.

The turret 17 is intermittently operated or rotated step by step through the action of a star wheel, as 25, mounted near the right end of the extension 18 and receives its motion from a pin or roller 19 attached to the worm wheel 117. It will be noted at this point that although the star wheel is fitted to permit endwise movement of the extension 18, the star wheel 25 is keyed against turning movement thereon.

As will be understood, it is desirable that the turret be rigidly held against rotation when the work carried thereby is being engaged by the tools. The means shown for accomplishing this function will now be set forth; it involves a brake band, such as that denoted in a general way by 26, and which constricts or locks the turret by engaging its

peripheral portion. As shown, (Fig. 13) such brake band or locker is made in two pieces; an upper piece, as 27, and a lower piece or section as 28. There is shown as mounted in bearings 29, 29 an endwise movable rod or shaft 30 which supports one end of the two sections, as 27 and 28, of said brake band or locker. The two sections 27 and 28 are held together loosely by bolt 31, it being understood that the relation between the bolt and the locker is sufficient to insure its functioning as a hinge member. A suitable means is provided for locking the sections 27 and 28 in clamped relation with the turret. The means shown for the purpose involve a nut, as 32, engaging the screw 33, as shown best in Fig. 13. The screw 33 has a threaded connection with the lower section 28 and has a non-threaded connection with the upper section through which its plain periphery extends and receives at its upper end the nut 32 backed up by a bushing 32'. As will be understood, the turning of the nut 32 on the screw 33 will cause either the tightening or loosening of the sections 27 and 28 of the locker 26 upon the periphery of the turret 17. Rotation of the nut 33 may be effected upon sliding movement of the turret by the arms 36 and 37 of the nut 32 coming in contact with the pin 34 mounted in the bracket 35, said bracket being adjustably mounted on the bed 3.

As before stated, the turret in its movement toward the left in Fig. 1 brings the work in contact with the tools and on this movement it is necessary to tighten the brake band or locker upon the turret. This is accomplished by the arm 36 (Fig. 1) coming in contact with the pin 34 and thus turning the nut 32 upon the screw 33 to tighten the locker. An opposite motion will cause the loosening or unlocking of the brake band.

As it is necessary that the work and the tools be in perfect axial alinement, we have provided seats, such as slots or grooves 38, (Fig. 13) adapted to be engaged by the dog 39, said dog being mounted upon the arm 40, connected at one end to the shaft 30 by a bolt, as 41. At its other end the arm 40 is connected with the resilient connecting rod 42, which has mounted on its lower extremity the roller 43 held within a path 44 of the lever 45, rigidly mounted on a shaft 46 supported for rocking movement in the brackets 47, said brackets being connected to the base 3. Rigidly connected to the shaft 46 is an actuating lever 48 which has mounted upon it a stud or roller 49 to be acted upon by a cam, as 50, attached to the cam shaft 51. The actuating lever 48 has an extension or handle 52 to permit the hand operation of the dog. The cam 50 is timed so that when the turret has ceased

its indexing movement the dog 39 is caused to project into the slot or seat 38, thus holding the turret positively after which time, as before explained, the brake bands or lockers are clamped.

It might be well at this time to explain that the connecting rod 42 is made resilient as a protection to the functioning parts against breakage or damage should the dog 39 fail to enter the seat or slot 38.

As before stated, the turret carries five receiving collet chucks, as 54. These collet chucks are of a special design the sole invention of Robert S. Brown and made the subject matter of his sole application, Serial No. 34,869, filed June 4, 1925. These chucks are of a type that may be used to advantage in this machine, and hence will be described in detail. They may be adjusted so that the opening or closing of the collet may be caused to occur at the proper moment to grip securely the particular size of the work which is to be operated upon. The chuck consists of a body, as 53 (Fig. 17) which houses within it the collet 54, said collet being held against rotation within the body by the pin 55 passing through an elongated slot in said collet (slot not shown). The collet is slotted as is common with such structures and the taper at the left (Fig. 17) is of the common, ordinary design. The right end of the collet is in threaded connection with a connecting bar 56, said connecting bar being slotted to receive the slabbled actuator 57, the outer end of which is threaded, as at 58, to receive upon it the threaded split nut 59 (Fig. 18), said nut being held against longitudinal movement by a groove in the connecting bar 56. Attached to the semi-circular halves of the nut 59 is the collar 60 held in fixed relation with same as by the screws 61 generally termed "a dutchman", as shown in Fig. 19. In the body portion of the slabbled actuator is the elongated slot or hole 62 which receives the eccentric collar 63 integral with the collet actuating stud 64, suitably mounted in bearings 65 and 66 in the turret body (see Fig. 17).

As will be seen, the turning of the nut 59 and collar 60 upon the threads 58 will change the longitudinal relations with the actuating rod 56 and thus change the size of the opening in the collet either by increasing or decreasing in accordance with the direction in which the nut is turned. In the brake band or locker 27 is the elongated slot 67 (Fig. 16) to provide an opening for the insertion of a key, as 24, to operate chucks 23. Within the slot 67 is the cam path 68 positioned in such a manner that its operative portion or cam path 68 will act upon the collar 69 on the shank of the key 24 and in case of the neglect of an attendant to remove the same from the

stud 64 will automatically do so by action of the turret in its movement from station to station.

The tool spindles as 12, 13, 14 and 15, as before stated, are mounted for rotation in the up-rights 4 and 5, suitable bearings being provided for same in said up-rights. The spindles 12, 13 and 14 are adapted to be operated in one direction as for drilling, turning, etc., while the spindle 15 is adapted to be rotated in either direction, the reversing of rotation being automatically accomplished by certain parts, which will be described hereinafter, the reversal or rotation being required when a piece of work is being threaded for instance. Mounted on the spindles 12, 13 and 14 are the change gears 75, 76, and 77 (Figs. 1 and 8) rotative by the change gears 78 and 79 mounted upon the shaft 80. The right end of the shaft 80, as seen in Fig. 2, is mounted in the removable bearing 81 suitably mounted in the up-right 4, the other end being supported in a bearing 82 of the block 9. The shaft 80 receives its motion by the gear 83 mounted on the shaft 80 in engagement with a gear 84 mounted at one end of the shaft 10, said shaft being rotated by the pulley 11, as hereinbefore set forth. As the spindle 15 is a threading spindle it is desirable that the same should be reciprocated, that is: a movement one way to bring the tool in contact with the work and the other way when removing the same, it being understood, however, that when the threading tool is in cutting relation, such as in threading, the thread will cause the tool to advance owing to its helical relation with the work. It will be hereinafter set forth that a cam advances the threading tool up to the point when the work is engaged, the subsequent operation being as also set forth. As will also be understood a threading tool when in cutting relation with a piece of work, must be driven or rotated at a speed consistent with the ability of the tool, and in removing same from the work the speed may be much faster, which will be explained later.

The horizontal movement of the spindle 15 is accomplished by the action of a cam 86 mounted on the cam shaft 51 (see Fig. 2) said cam acting against an anti-friction roller or stud 85 (see Fig. 10) at one end of a lever 87 pivoted at 88, the other or forked end being engaged as by studs or dogs in the grooved hub of the gear 89, said gear being rigidly attached to the spindle 15. The spindle 15 receives its rotary motion by the gear 89 in engagement with the gear 90 mounted for reversible rotation on a reversing shaft 91, the reversing action being accomplished by clutch members 92 and 93 being brought into engagement with the shaft 91 by the action of a sliding member

94 keyed to the shaft 91 and in grooved relation with dogs or studs mounted in the forked end of the lever 95, rigidly mounted for rocking movement with one end of a shaft 96 (see Fig. 8) suitably mounted in the bearing 97 of the block 9. At the other end of the shaft 96 is rigidly mounted the cam lever 98, its free end having a stud or roller 99 to be acted upon by the cams or dogs 100 and 101 attached to the cam shaft 51. The sliding member 94 is adapted to engage or disengage the shaft 91 to the clutch members that is when one of the clutch members is in engagement with the shaft 91, the other will be out of engagement, and vice versa. The clutch member 92 is driven by its geared portion 102 being in engagement with the gear 103 rigidly mounted upon the spindle 14 (see Fig. 10). An opposite rotation of this clutch member may be obtained for instance when a left-hand thread is wanted in the work by the double faced intermediate gear 104 mounted on a stud 105 (see Figs. 11 and 12). The gear 102 in this case is in engagement with one face of the intermediate gear 104, the other face of the gear 104 being in engagement with the gear 103. The clutch member 93 is driven by its geared portion 106 being in engagement with the gear 107, in engagement with the gear 108 keyed to the tubular shaft 108' rotatable with the pulley 11 (see Figs. 2 and 6). The opposite rotation of this clutch member is obtained by the addition of the double faced intermediate gear 109 mounted on a stud 110 (see Figs. 6 and 7) the gear 106 engaging the gear 107 which engages one face of the double gear 109, its other face engaging the gear 108. As will be readily understood, the insertion of the gears 104 and 109 will impart a rotation to the spindle 15 in an opposite direction without affecting the other parts or the cycle of the machine and will cut a left-hand thread whereas the omission of the gears will cut a right-hand thread. It will also be noted that by this particular arrangement it is possible to rotate the threader slowly, when in cutting relation with the work and faster when leaving the work.

Another saving of time is effected by the operation of the cam shaft at two different speeds, the cam shaft being rotated at the slower speed when the tools are acting upon the work and is automatically changed to a higher speed for the remainder of a cycle. The cam shaft 51 is suitably mounted at each end in the bearings 115 and 116 and receives its rotation by the worm wheel 117 mounted at one end of the cam shaft, in engagement with the worm 118 on the shaft 119 mounted on suitable bearings 120 of the block 116 (see Fig. 5). The shaft 119 receives its motion from the beveled gear 121 mounted upon one end of the shaft and in

engagement with the beveled gear 122 mounted upon one end of a shaft 123 supported for rotation in the bearings 124 and 125 attached to the bed 3 (see Fig. 3). This shaft is adapted to receive its power either by a hand operation of a spiral gear 126 in engagement with a spiral gear 127 rotatively mounted thereon near the end of the shaft 123, or by power received through the agency of the pins 128 in the collar 129 integral with the spiral gear 127. The sliding collar 130 is keyed to the shaft 123 and slidable thereon and when the pins 131 are in engagement with the pins 128 the hand power is in engagement when the collar is slid so that the pins 132 are in engagement with the pins 134 of a collar 135 as shown in Fig. 3, a power drive is instituted. The collar 135 is mounted upon the shaft 136, said shaft being mounted in suitable bearings, such as 137 and 138, and is adapted to be operated at two different speeds. The two different speeds are accomplished automatically by the action of two clutch members as 139 and 140 being brought into engagement in operative relation with the shaft 136, it being understood that only one clutch member will be in engagement at any one time. The ratchet clutch member 139 (Figs. 8 and 9) receives its power by its geared portion engaging the beveled gear 141 mounted on one end of a stub shaft 142, its other end having a gear 143 in engagement with the gear 144 mounted on one end of a shaft 145, its other end having a worm wheel 146 in engagement with a worm gear mounted upon a shaft 147 (worm gear not shown) said shaft having the sprocket wheel 148 mounted to be driven by the sprocket wheel 149 through the agency of the chain 150, the sprocket wheel 149 being mounted upon the spindle 14 from which it receives its power. The clutch member 140 receives its power from a sprocket 151 mounted upon the integral hub 152 of the clutch member 140 through the chain 153 driven by the sprocket 154 mounted upon the tubular hub 108' of the pulley 11 (see Figs. 1, 2, 3, 4 and 8). The clutch member 140 is brought into alternate engagement with the shaft 136 by the action of a collar 155 slidably mounted upon the shaft 136, the end of which is adapted to cause a connection with the clutch member 140. As this is quite old, a further description of this particular action will be unnecessary. The collar is brought into or out of engagement with the clutch member 140 by the action of cams or dogs 156 and 157 mounted upon the cam shaft 51 acting against the stud or roller 158 in the lever 159 pivoted at 160, its forked end being in grooved relation with the sliding collar 155, as shown in Fig. 9. The extended end 161 of the lever 159 is for the hand operation of the same.

It should be understood that one of these clutch members, namely: 140 is driven at a higher rate of speed than the ratchet clutch member 139. Therefore, when a higher rate of speed is required the cam 157 would come in contact with the roller 158 and cause the higher speed clutch member 140 to become engaged to the shaft 136, the collar 130 being brought in clutched relation with the clutch member 140 (see Figs. 3 and 9). This will drive the cam shaft at the high rate of speed, and when the other clutch member is brought into engagement, a lower rate of speed for the cam shaft is the result.

It might be explained that the clutch member 140 is driven at a higher speed than the ratchet clutch member 139 so that as a consequence when the sliding collar or sleeve 155 is pushed into engagement with the clutch member 140 so as to drive the coupling member, it will drive the shaft 156 ahead of the ratchet. When the coupling member is moved to the left and disengaged from the clutch member 140, as a result, the relatively slower speed of the ratchet clutch 139 drives the shaft 136.

The sliding collar 130 is slid to hand power feed as by the forked lever 162 mounted at one end of a shaft 163, mounted in bearings 164 and 165 (see Fig. 10) its other end having the hand operating lever 166 having a detent 167 adapted to come to engagement with seats, the seats being in a block, as 168, said seats acting to hold the collar in power relation or hand relation.

As before stated, the hand feed of the cam shaft receives its power through the spiral gears 126 and 127, the spiral gear 126 being mounted upon an end of the shaft 169 suitably supported in the bearing 170 attached to the bed 3, the other end of the shaft 169 being arranged to receive a crank handle not shown.

What we claim is:

1. A machine of the class described comprising a U-shaped bed, a turret mounted in the U-shaped bed, means for the rotation and endwise movement of the turret longitudinally of the bed, and a structure above the U-shaped bed for supporting the turret at opposite sides thereof, and a plurality of spindles sustained by such structure.

2. A machine of the class described, comprising a U-shaped bed, a turret mounted in the U-shaped bed, means for the rotation and endwise movement of the turret longitudinally of the bed, and a structure above the bed for sustaining the turret and having means for supporting same at opposite sides thereof, and a plurality of spindles sustained by the structure.

3. A machine of the class described, having a U-shaped bed, a turret mounted in the U of the bed, means for reciprocating the

turret in the bed, clamping mechanism associated with the turret, a means mounted on the bed for setting and unsetting said clamping mechanism at different points in the reciprocation of the turret.

4. A machine of the class described, having a U-shaped bed, a turret mounted in the U of the bed, means for reciprocating the turret in the bed, clamping mechanism associated with the turret, means for setting and unsetting the clamping mechanism at different points of the reciprocating travel of the turret and a locking means for locking the turret against rotation.

5. A machine of the class described, comprising a U-shaped bed, a turret rotatable in the U of the bed, mechanism for reciprocating the turret, a spindle for sustaining the turret, a sustaining spindle on the turret and extending therefrom, and a longitudinally adjustable member carried by the first spindle.

6. A machine of the class described comprising a bed, a turret sustained by the bed, a chuck on the turret, means comprising a removable crank for opening or closing the chuck, and a clamping member around the turret, provided with means for dismounting the crank on the rotation of the turret.

7. A machine of the class described consisting of a rotary turret, means for supporting the turret at the front and rear thereof, a bar mounted in parallelism with the axis of rotation of the turret, a clamping band associated with the turret and carried by the bar, and means for setting and releasing the band at predetermined points in the reciprocation of the turret.

8. A machine of the class described, comprising a turret, a band associated with the turret, indexing mechanism for the turret, a plurality of chucks on the turret, having hand operable means for actuating the chucks, and a cam on the band for automatically withdrawing the chuck-operating means.

9. In a machine of the character described, a rotatable member carrying a chuck, a chuck actuator, and means for automatically withdrawing said chuck actuator upon and by rotation of said rotatable member.

10. In a machine of the character described, a rotatable member, a chuck thereon, and means adjacent said chuck engaged by said actuator upon rotation of said member for automatically withdrawing said chuck actuator.

11. In a machine of the character described, a rotatable member, a chuck thereon, means including a fixed cam adjacent said chuck for automatically removing a chuck actuator from said chuck upon and by rotation of said rotatable member.

12. In a machine of the character described, a casing, a rotatable and axially

movable turret therein, means for indexing the same, a locking member for engaging a cylindrical portion of said turret to clamp the same in indexed position within said casing in any axial position, cam operated means for actuating said locking means, and manual means for actuating said locking means.

13. In a machine of the character described, a substantially U-shaped bed, a plurality of upstanding webs extending transversely of said bed and integral therewith, and a tie member integral with and connecting the said webs, said webs having bearings for supporting a turret and a spindle.

14. In a machine of the character described, a bed having integrally cast upstanding webs, a tie member connecting the upper ends of said webs, said tie member and webs being integrally formed, a turret supported by at least one of said webs, and spindles supported by at least one of said webs.

15. In a machine of the character described, a bed of substantially semi-circular cross-section, a plurality of webs on and extending above said bed of substantially semi-circular cross-section, a turret supported by at least one of said webs, and spindles supported by at least one of said webs, and a tie member connecting said webs.

16. In a machine of the character described, a bed, a turret supported for rotation thereon, a star wheel for rotating said turret step by step, a shaft having a pin outstanding from an arm thereon for rotating said star wheel, driving means for said shaft, said driving means and star wheel being located close together.

17. In a machine of the character described, a bed of substantially U-shaped cross-section, a main cam shaft within said bed, a turret supported above and extending partially within said bed, spindles supported above said bed, and means controlled by said cam shaft for rotating said turret step by step, means for locking said turret against rotation, and means for clamping said turret in locked position.

18. In a machine of the character described, a turret, means for indexing the

turret, means for moving the same longitudinally of its axis of rotation, locking means movable with said turret during reciprocation thereof for holding the same against rotation, and clamping means movable with said turret during its reciprocation for clamping and holding said turret in indexed position.

19. In a machine of the character described, a turret, means for rotating the same step by step, means for reciprocating the turret longitudinally of its axis of rotation, a guide bar carrying locking means movable with said turret during its reciprocating movements, and clamping means carried by said guide bar and movable with said turret during its reciprocating movements.

20. In the combination defined in claim 19, means for automatically causing said locking means to lock said turret in indexed position, and manual means for controlling said locking means in any position of longitudinal movement of said turret.

21. In a machine of the character described, a turret, means for indexing the same, means for reciprocating the turret, a guide bar slidably mounted parallel to the axis of rotation of said turret, locking means carried by and movable with said guide bar for locking said turret in indexed position, and means for causing said locking means to engage said turret after the same has been indexed.

22. In a machine of the character described, a turret, means for indexing the same, means for reciprocating the turret, a guide bar supported for movement longitudinally of the axis of rotation of said turret, a turret clamp movable with said turret and said guide bar, and means for setting and unsetting said turret clamp.

23. In a machine of the character described, a bed of substantially U-shaped cross-section, a pair of spaced apart legs for supporting said bed at one end, and a single leg for supporting said bed at the other end.

In testimony whereof we affix our signatures.

ROBERT S. BROWN.
JOHN H. MONTSTREAM.