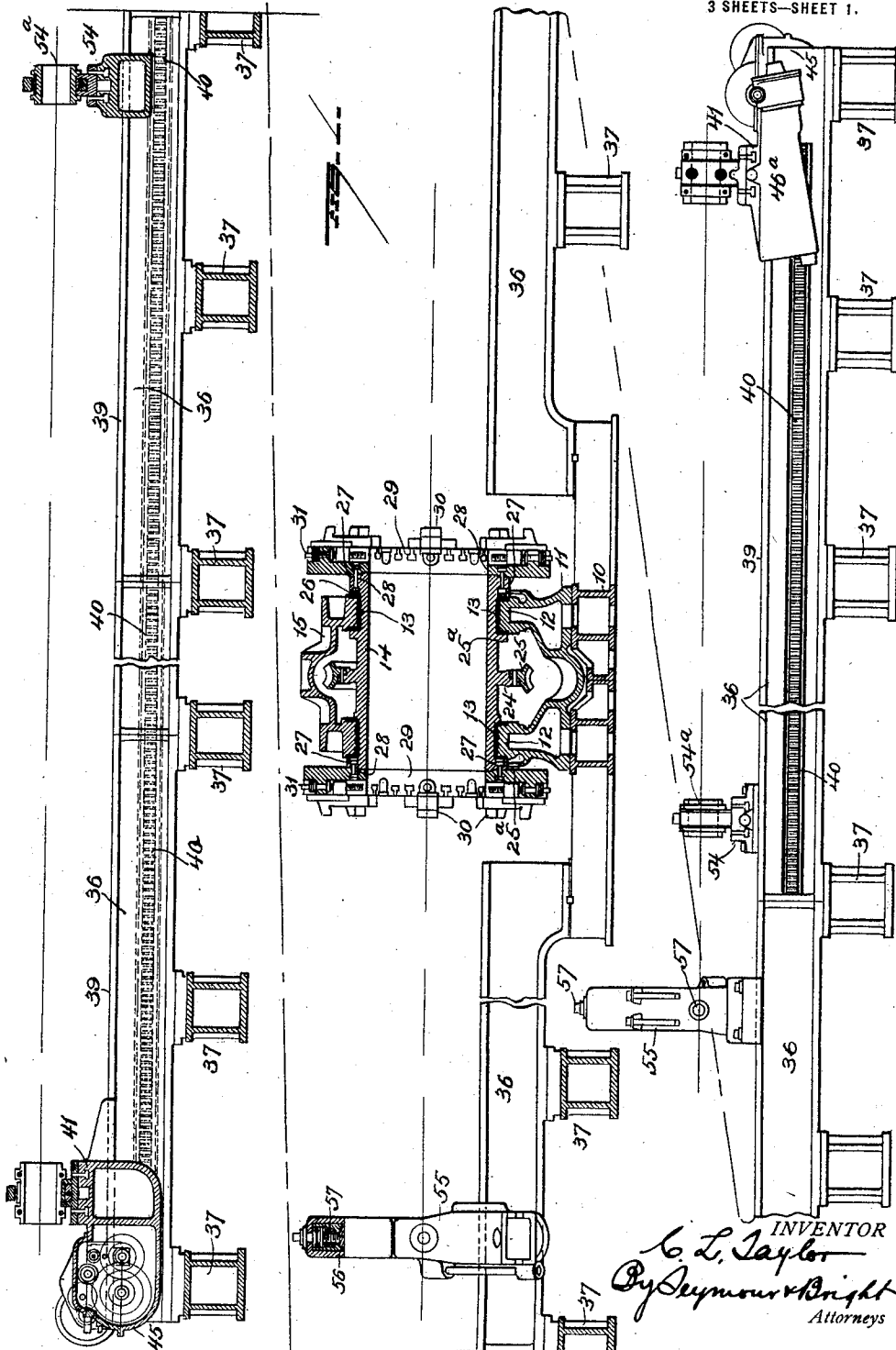


C. L. TAYLOR.
BORING LATHE.
APPLICATION FILED MAY 29, 1919.

1,388,905.

Patented Aug. 30, 1921.

3 SHEETS—SHEET 1.



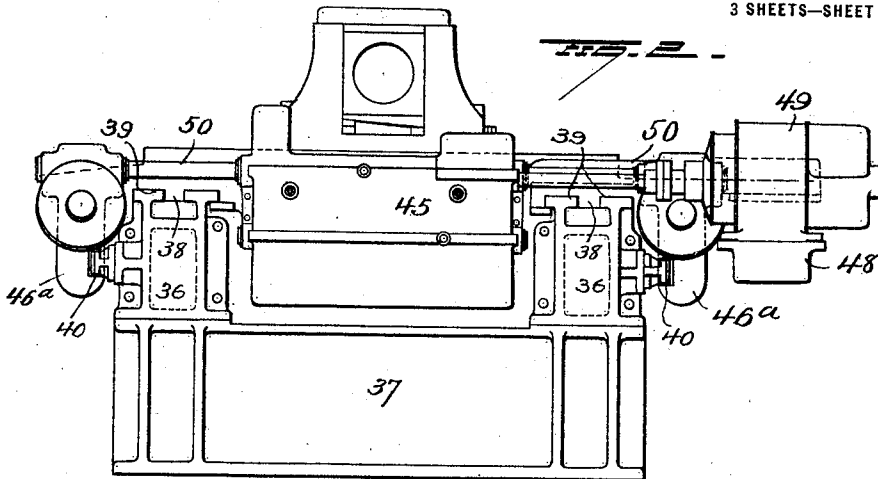
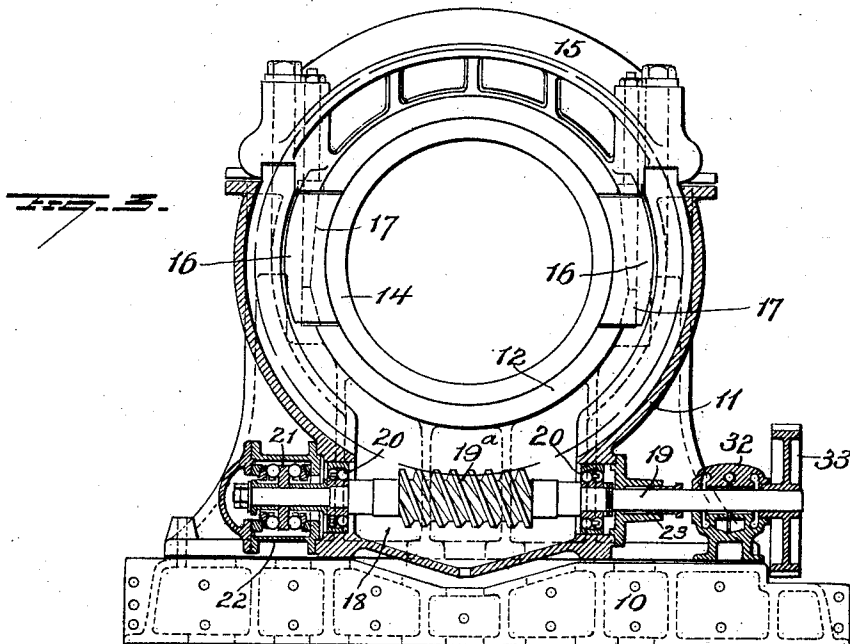
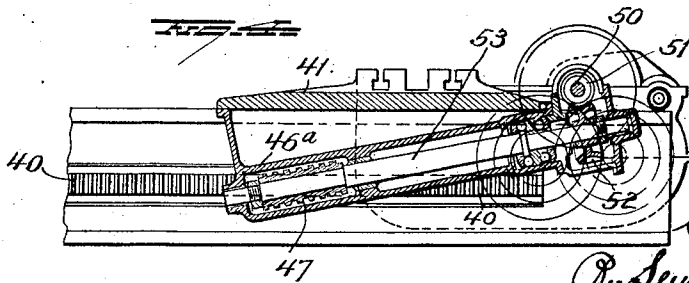
INVENTOR
C. L. Taylor
By *Seymour & Bright*
Attorneys

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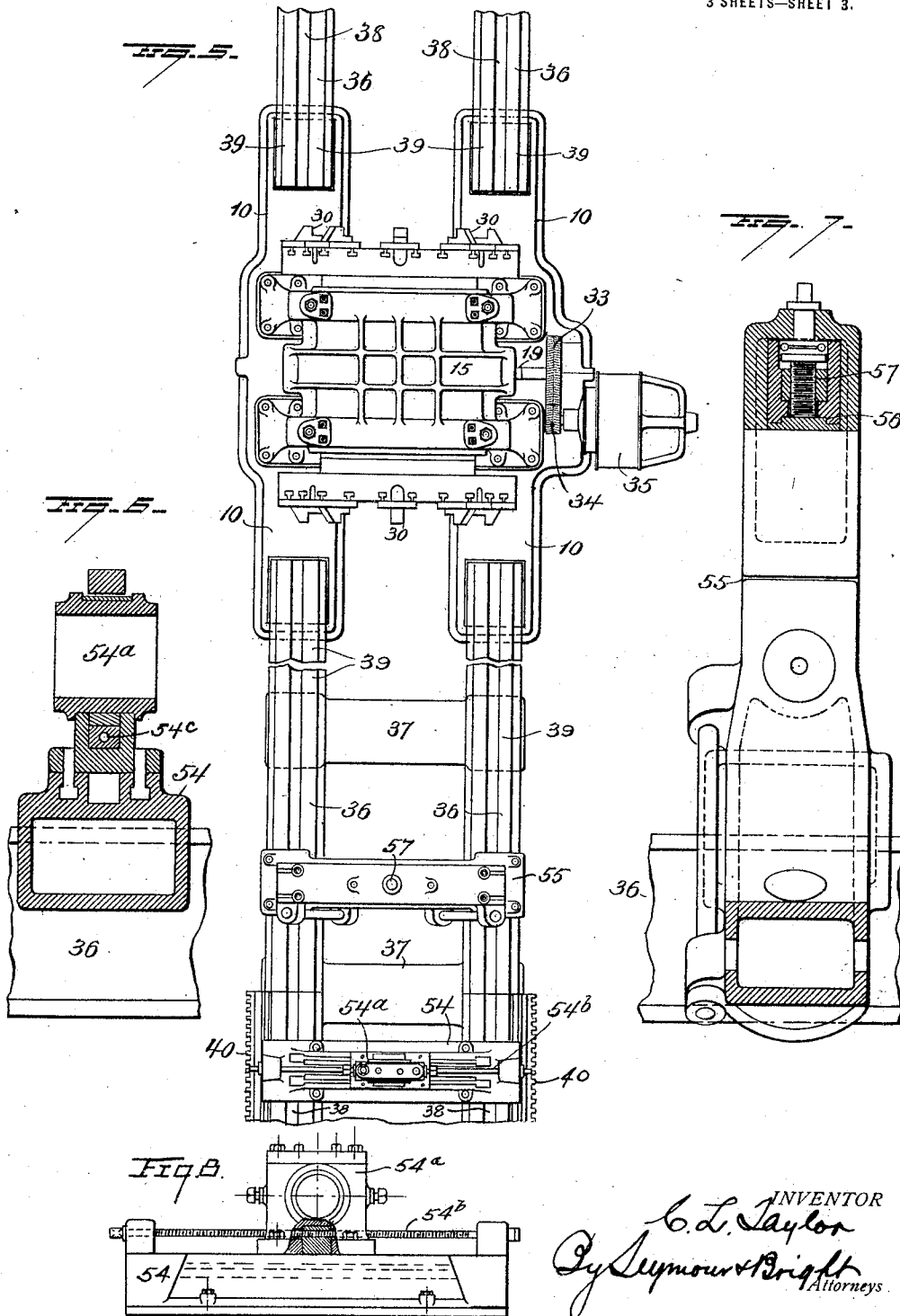


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UNITED STATES PATENT OFFICE.

CLARENCE L. TAYLOR, OF ALLIANCE, OHIO, ASSIGNOR TO THE MORGAN ENGINEERING COMPANY, OF ALLIANCE, OHIO.

BORING-LATHE.

1,388,905.

Specification of Letters Patent. Patented Aug. 30, 1921.

Application filed May 29, 1919. Serial No. 300,599.

To all whom it may concern:

Be it known that I, CLARENCE L. TAYLOR, a citizen of the United States, and a resident of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Boring-Lathes; 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.

My invention relates to an improvement in boring lathe, designed particularly for boring longitudinally through very long pieces such as the large guns used by the Army and Navy.

In boring these large guns it is customary to secure the latter centrally within a hollow cylinder and rotate the cylinder thus rotating the gun, and to operate on it at both ends with non-rotating tools which are driven through the work toward each other, so as to meet at the center.

In the lathes now in use the cylinder carrying the gun and the feed mechanism of the boring tools are driven from the same motor either by positive means such as toothed gearing and shafts, or by non-positive means such as belts or friction gearing.

The object of the invention is to dispense altogether with mechanical connection between the mechanism for rotating the cylinder and the mechanism for feeding the boring tools, thereby eliminating a mass of gearing necessary to revolve the cylinder and get the reduction down to the lead screws which operate the feed of the boring tools, and it consists in the combination and arrangement of parts as will be more fully explained and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in side elevation of a lathe embodying my invention, parts of the bed being broken away; Fig. 2 is an end view of the same; Fig. 3 is a view in cross section through the headstock and cylinder which carries and rotates the gun; Fig. 4 is an enlarged view partly in section of one end of the lathe showing mechanism for feeding the boring tools; Fig. 5 is a view in plan of the headstock and parts of the lathe at both sides of the headstock; Fig. 6 is a view of the guide; Fig. 7 is a view of the work rest

and Fig. 8 is a view partly in elevation and partly in section of one of the guide rests.

10 represents a bed plate and 11 a headstock bolted to the bed plate. This headstock is a heavy iron casting of box section, and is provided internally with two bearings 12 faced with Babbitt metal 13 in which the cylinder 14 is mounted to rotate. The top 15 of the headstock is removable and is in the form of a large cap secured to the main casting by bolts. It has bearings conforming to the bearings 12 of the body 11, and provides a means for up and down adjustment to compensate for wear. Side adjustment is also provided for by the loose side sections 16 of the bearings held in place by the adjustable wedges 17. The lower part of the headstock is provided with a well 18 for oil and is bored at right angles to the axis of its main bearings for a worm drive shaft 19, which is mounted in two annular ball bearings 20, and one end thrust ball bearing 21, the latter being totally inclosed in a casing 22 bolted to the main casting. The oil well is thus sealed at one side by the casing for the thrust bearing and at the other side where the extension of the worm passes through the headstock it is fitted with a gland 23 for soft packing so that a generous supply of oil can be maintained in the well for lubricating the worm 19^a, and be sealed therein by the thrust bearing casing 22 at one end and the gland 23 at the other end.

The cylinder 14 is hollow to receive the gun at or about the center of the length of the latter and has an outside central web 24 to which is bolted a worm gear 25, preferably of bronze. It is flanged as at 25^a to engage the bearings 12 for preventing axial movement of the cylinder with relation to the headstock, and is provided with a loose thrust ring 26, so that in the event of wear due to axial thrust the ring only need be renewed.

The two end flanges 27 of the cylinder 14 receives the bolts 28 which secure the clutches 29 in place, and the latter are provided with chucks or clamps 30 which are adjusted by the screws 31. These jaws engage the work and clamp it to the cylinder so that it rotates with the latter.

The shaft 19 is mounted adjacent its outer end in the bearing 32 and is provided at its

outer end with a toothed wheel 33 which engages the smaller toothed wheel 34 on the armature shaft of the variable speed motor 35 which latter is seated on a shelf rigid with the headstock or with the base 10 carrying the headstock, and operates to rotate the cylinder and the gun carried by the latter.

The bed of the lathe consists of two pairs of castings or ways 36, connected at their adjacent ends to the head stock base plate, and extending at both sides from the latter, the combined length of the two ways 36 and the head stock base plate being of course greater than the combined length of the gun and the two boring tools. On account of their length, these ways 36 are made in sections bolted together and bolted also to the transverse tie pieces 37 which support the bed on its foundation and maintain the parallelism of the two ways. The tops are planed straight and smooth to support the tool carriages and they are also provided with a central planed slot 38 which form guides for the said carriages. They are also provided at the top with side flanges or projections 39 which are engaged by projections on the tool carriages to insure against lifting of the latter under upward strains, and at their other sides with the toothed racks 40 which are engaged by worms carried by the tool carriages.

The tool carriages 41 carry the driving and change gear mechanism for feeding the carriage longitudinally along the ways 36, and two aprons 46^a at the sides carry and inclose the worms 47 which are driven by said driving and change gear mechanism and which mesh with the racks 40 for propelling the tool carriage toward and away from the head stock. The tool carriage is also provided at one side with a shelf or support 48, for the motor 49 which actuates the gearing within the casing 45. This driving and change speed gearing may be of any approved design capable of giving a slow, intermediate slow, intermediate fast and fast speeds in feeding the tool toward the work, and a fast return for empty travel only, and so constructed that each speed obtained by a different set of gears is susceptible of regulation within a range of one to four. The driven shaft 50 of this driving and change speed gearing projects at both ends of the casing 36 and is provided at its ends with the worms 51, one of which is right hand and the other left hand, so that all end thrust is taken up within the shaft and no external thrust bearings are required excepting such as may be required to take care of slight inequalities only. These worms 51 engage worm wheels 52 on the shafts 53 carrying the worms 47, which as before explained, are in mesh with the rack bars 40 at the outer side of the ways 36.

The free end of the boring tool, (not shown) is supported in the guide rests, through which the boring tool is free to move. These rests consist of heavy cast bases 54 rigidly fastened to the ways 36, and having guide ways on the top and guide blocks 54^a mounted to move on said ways, screw mechanism 54^b being employed for such side-wise adjustment.

The work is supported at its free end in the rests 55, each of which consists of a heavy cast annular frame rigidly fastened to the ways 36. The top of this annular frame is removable and is attached to the base of the annular frame by heavy bolts and both parts, to wit, the body of the frame and its removable top section are provided with a series of cylindrical plungers 56 actuated by screw 57, the said plungers being distributed around the circumference of the rests for centering the work.

In the operation of the lathe the gun forging is inserted in the cylinder 14 and gripped in the middle by the chucks or clamps 30, and the overhanging ends are inserted in the steady rests, and clamped thereto. The long boring tools are rigidly held at their rear or outer ends by the tool holders 42 carried by the tool carriages, and are supported at their free ends by the guide rests where they are free to slide in a longitudinal direction only. After the work has been properly placed and secured the cylinder is rotated and the boring tools fed toward each other and into the work.

In this improvement there is no mechanical connection between the mechanism for rotating the cylinder and the mechanism for feeding the tools toward and away from the work. In all other lathes that I am aware of there is as before stated a mechanical connection between these parts. In my device the only connection between the rotating cylinder and the moving tool carriage is the electrical connection between the motors which is amply sufficient to insure the uniformity required for smooth turning or boring and has every advantage possessed by a belt or other friction connection.

It is evident that many slight changes might be resorted to in the relative arrangement of parts shown and described without departing from the spirit and scope of my invention. Hence I would have it understood that I do not wish to confine myself to the exact construction and arrangement of parts shown and described, but

Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is:—

1. In a lathe, the combination of a headstock, a cylinder therein and carrying clamping mechanism to engage the work, a motor and gearing for rotating the cylinder, carriage ways at opposite sides of the head-

stock, a carriage on each of said ways, a rack on each side member of the ways, a motor on each carriage, gearing actuated by said carriage motors and meshing with said rack bars and a tool holder on each carriage.

2. In a lathe, the combination of a headstock, a cylinder therein and carrying clamping mechanism for the work and means for rotating the cylinder, carriage ways at opposite sides of the headstock, a carriage on each of said ways, a rack on each side member of each carriage way, a motor on each carriage, a shaft driven by each of said motors and provided at each of its ends with a worm, gearing driven by each of said worms and engaging the racks at the sides of the ways and a tool holder on each carriage.

3. In a lathe, the combination of a headstock, a cylinder therein, and means for rotating the cylinder, carriage ways at opposite sides of the headstock, a rack at the opposite sides of each carriage way, a carriage on each of said ways, a motor on each carriage, a driven shaft on each carriage having a worm at each end, gearing carried by the carriage, driven by said worm and engaging the rack bars at the sides of the ways for propelling the carriage on the ways, a tool holder on each carriage, and guide rests on the ways for supporting the free ends of the boring tools.

4. In a lathe, the combination of a headstock, a cylinder therein, and means for rotating the cylinder, carriage ways at opposite sides of the head stock, a rack at the two sides of each carriage way, a carriage on each of said ways, a motor on each carriage, a driven shaft constituting a member of change speed gearing carried by each carriage and actuated by the said carriage motors, a worm at each end of each driven shaft, gearing actuated by the said worm

and engaging the racks at the sides of the carriage ways and a tool holder on each carriage.

5. In a lathe, the combination of headstock consisting of a frame and a cylinder mounted to rotate in the same, a worm wheel encircling the cylinder and fixed to it, shaft bearings in the frame below the cylinder, a worm shaft journaled in said bearings, thrust bearings for the shaft at points removed from the worm, a motor fixed with relation to the headstock and gearing connecting said shaft and motor.

6. The combination of a headstock consisting of a frame having a plurality of annular bearings, and a cylinder mounted in said bearings, the cylinder being provided with peripheral flanges to engage the sides of said bearings, and with a central peripheral flange, a worm wheel bolted to said central flange, a shaft mounted in bearings in the headstock frame below the cylinder and carrying a worm meshing with the worm wheel on the cylinder thrust bearings for the shaft at points removed from the worm, a motor secured in a fixed relation to the headstock and gearing connecting said motor and shaft.

7. In a lathe, the combination of a headstock frame, a cylinder mounted to rotate therein, means for rotating the cylinder, and work holding chucks detachably and adjustably secured to each end of the cylinder whereby the work will be clamped at two separated points.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

CLARENCE L. TAYLOR.

Witnesses:

A. W. BRIGHT,
MARY WISMER.