C. G. OLSON.

LATHE.

APPLICATION FILED DEC. 1, 1916.

1,238,935.

Patented Sept. 4, 1917.

4 SHEETS—SHEET 1.

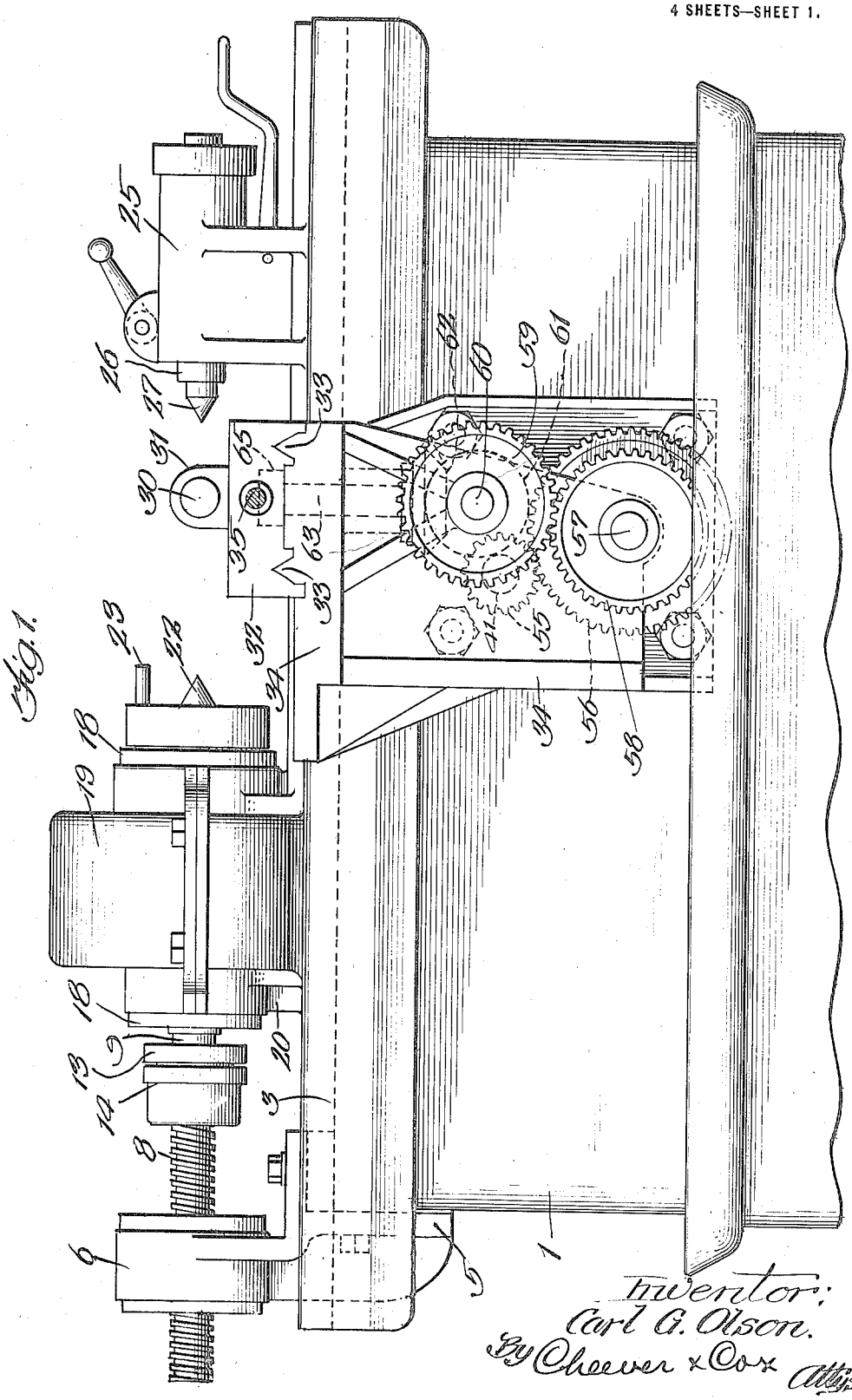


Fig. 1.

Inventor:
Carl G. Olson.
By Cheever & Cox
Attys

C. G. OLSON.

LATHE.

APPLICATION FILED DEC. 1, 1916.

1,238,935.

Patented Sept. 4, 1917.

4 SHEETS—SHEET 2.

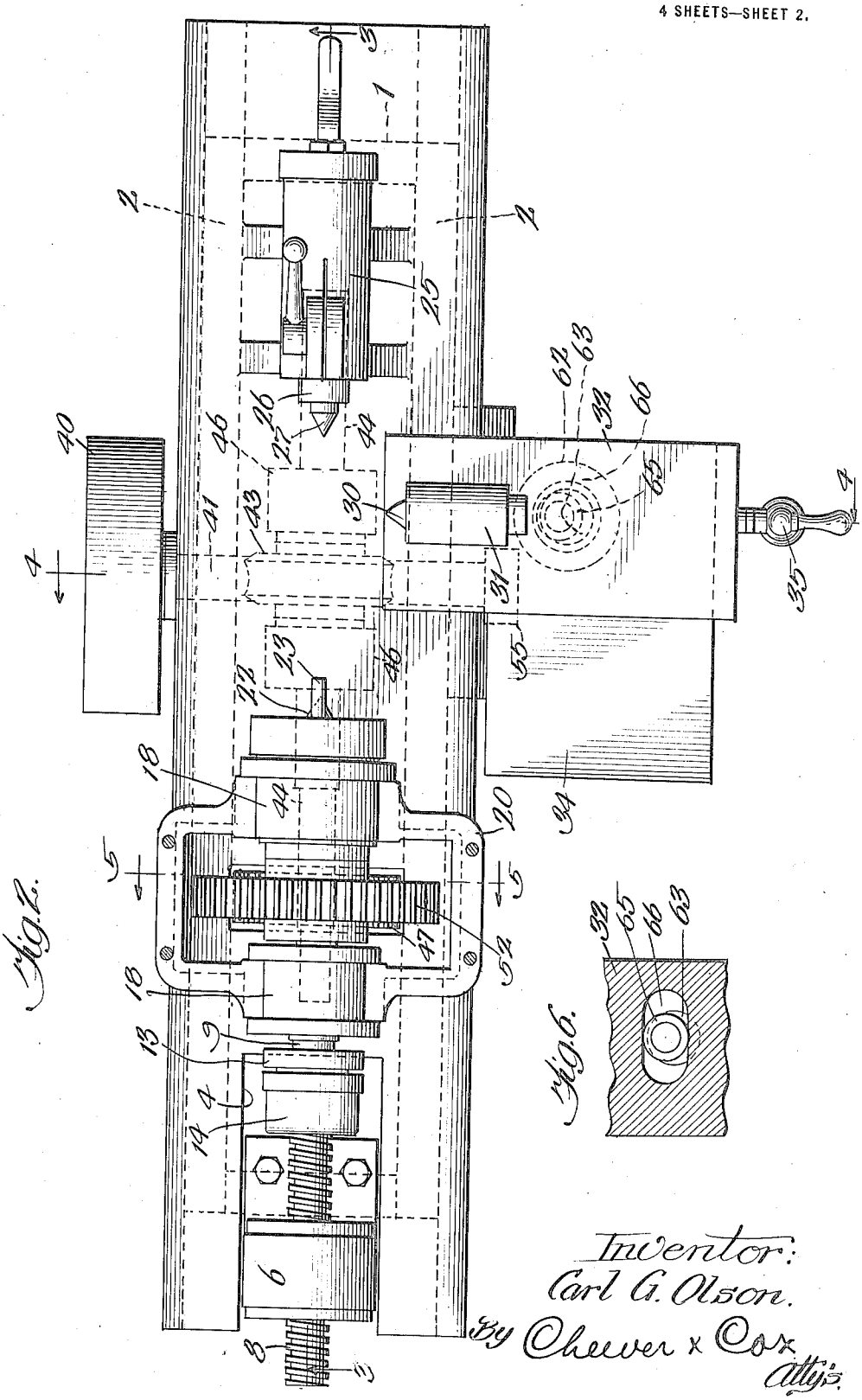


Fig. 2.

Fig. 6.

Inventor:
Carl G. Olson.
By Cheever & Cox
Atty's.

C. G. OLSON.

LATHE.

APPLICATION FILED DEC. 1, 1916.

1,238,935.

Patented Sept. 4, 1917.

4 SHEETS—SHEET 3.

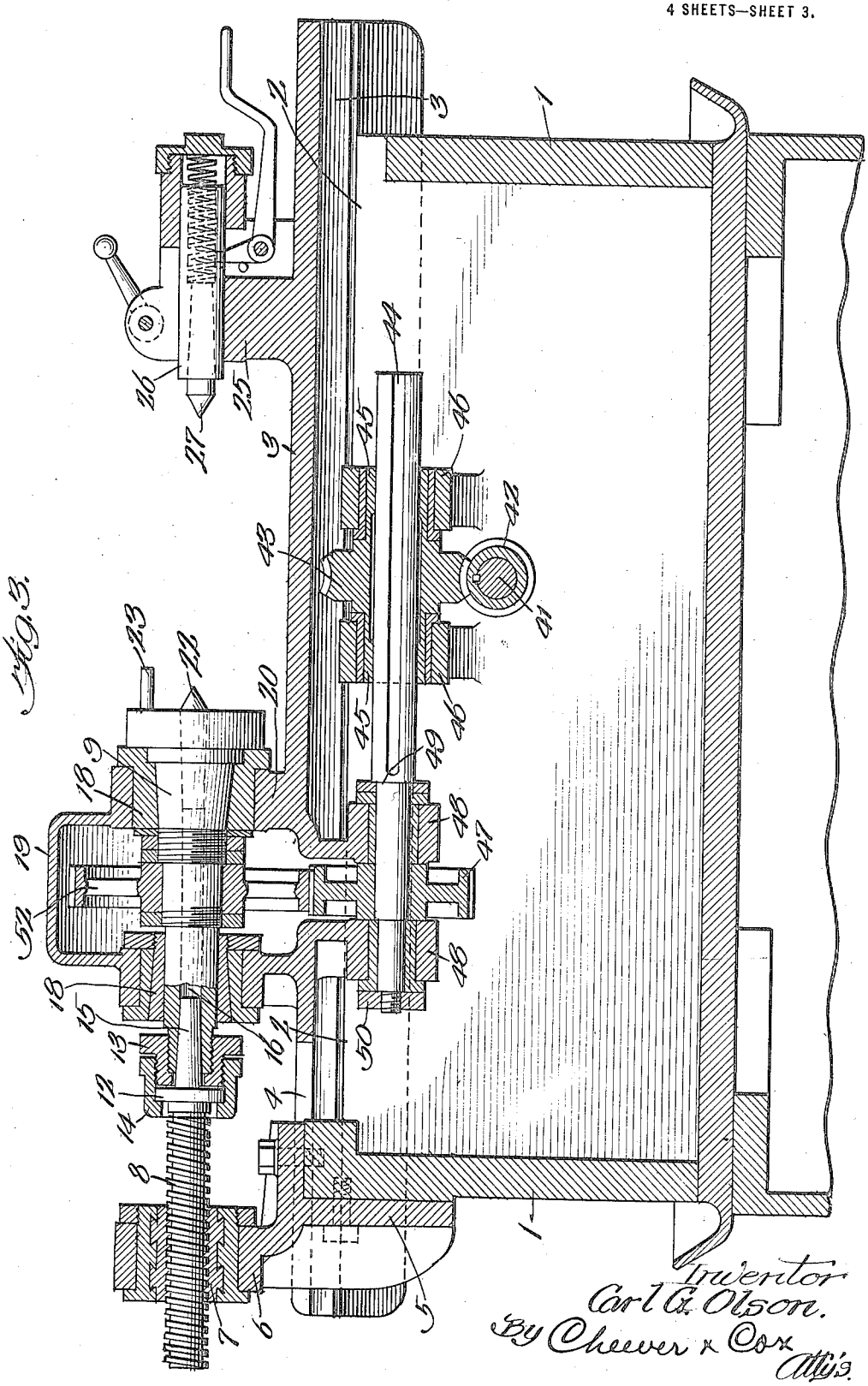


Fig. 3.

Inventor
Carl G. Olson.
By Cheever & Cox
Atty's.

C. G. OLSON.

LATHE.

APPLICATION FILED DEC. 1, 1916.

1,238,935.

Patented Sept. 4, 1917.

4 SHEETS—SHEET 4.

Fig. 5.

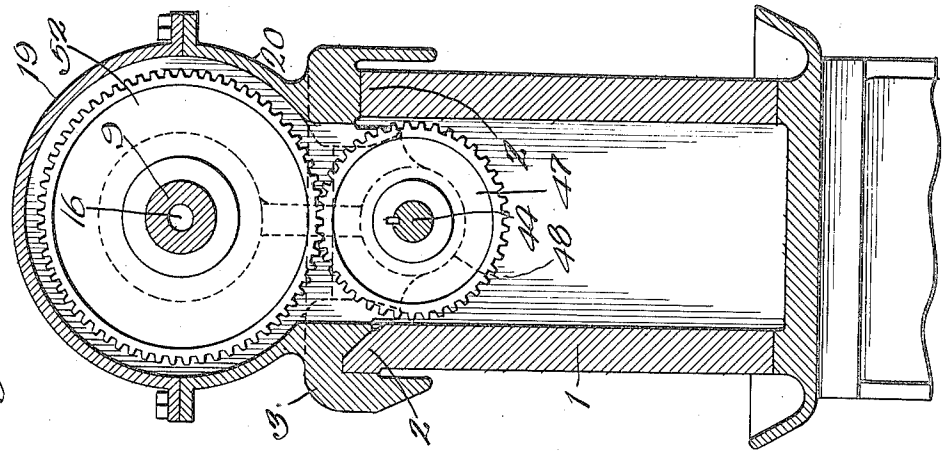
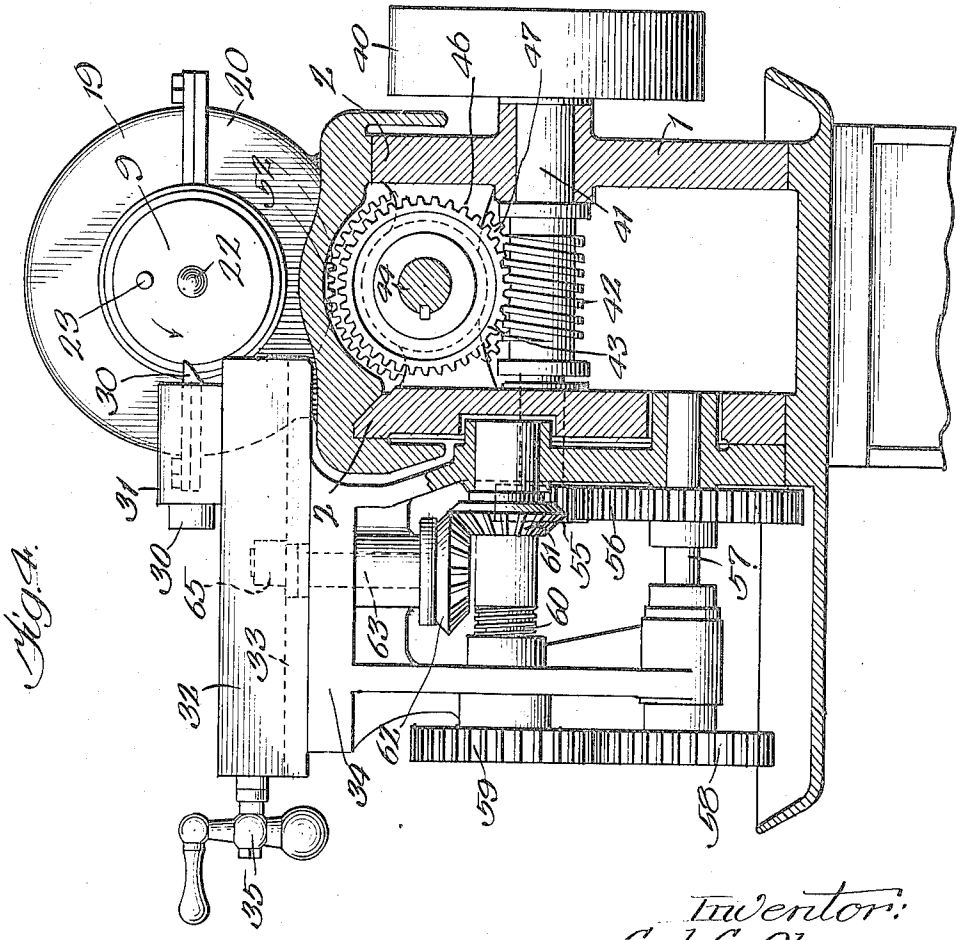


Fig. 4.



Inventor:
Carl G. Olson.
By Cheever & Cox Atty's.

UNITED STATES PATENT OFFICE.

CARL G. OLSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO ILLINOIS TOOL WORKS, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

LATHE.

1,238,935. Specification of Letters Patent. Patented Sept. 4, 1917.

Application filed December 1, 1916. Serial No. 134,245.

To all whom it may concern:

Be it known that I, CARL G. OLSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Lathes, of which the following is a specification.

My invention relates to lathes in which the head stock with its main spindle and the tail stock are mounted on a main carriage and travel past the tool. In this machine, the tool is mounted on a cross-carriage which moves transversely to the axis of rotation of the main spindle. The object of my invention is to provide a lathe of this general character and to carry out the design in an efficient and practical manner. In accomplishing this general object, I employ certain mechanical expedients which will be described in detail.

I accomplish my objects by the mechanism illustrated in the accompanying drawings, in which:

Figure 1 is a front elevation and Fig. 2 a plan of the assembled machine.

Fig. 3 is an elevation, taken chiefly in axial section through the main spindle. The plane of the section is indicated by the line 3—3, Fig. 2.

Fig. 4 is a transverse section of the machine on the line 4—4, Fig. 2.

Fig. 5 is a transverse section on the line 5—5, Fig. 2.

Fig. 6 is a plan view, partly in section, showing a portion of the cross-carriage and the eccentric which operates it.

Similar numerals refer to similar parts throughout the several views.

The main frame 1 of the machine may be of any suitable design and is provided with longitudinal ways 2 which form guides and supports for the main carriage 3. These ways are of great length, extending in the present design practically the entire length of the machine. The carriage is of still greater length in the present design being shown here as of greater length than any other part of the machine. This gives unusually long guide surfaces and, as a result, the carriage is guided very accurately, and furthermore, a large bearing surface is afforded which distributes the pressure over a large area and hence reduces the rate of wear to a minimum. At the head end of the machine—that is, the end nearest the head stock, the main carriage has a slot 4 for non-interference with the bracket 5 which is bolted to the main frame and has a standard 6 carrying a nut 7 in which the lead screw 8 works. These parts are shown in Figs. 1, 2 and 3.

The lead screw is rigidly fastened to the main spindle 9 co-axially therewith and while the fastening means may be varied, a suitable form of connection is shown in Fig. 3. In this form, the lead screw has a collar 12 formed upon it and this collar is held between a nut 13 and a cap 14 which screws on to said nut. Said nut, in turn, is internally threaded to screw upon the correspondingly threaded end of the main spindle. The lead screw has a taper point 15 which jams into a taper socket 16 in the end of the main spindle. When these parts are drawn up tight, the connection is very rigid, and furthermore, the lead screw and main spindle are in perfect alinement.

The main spindle is journaled in suitable bearings 18, carried by the housing 19 and housing base 20. Said base is rigidly fastened to the main carriage and, by preference, is integral therewith, as best indicated in Fig. 3. The result of this construction is that when the spindle is rotated, it rotates the lead screw, and as the lead nut 7 is stationary, it causes the carriage to travel upon the main frame. The spindle being mounted upon the carriage consequently travels with it. The spindle is provided with a center point 22 and dog 23 for respectively supporting and rotating the work, although these parts may be substituted by any type of chuck suitable for supporting and rotating the work.

The tail stock is rigidly fastened to the carriage opposite to the head stock and while these parts may be varied, they consist in the present instance of a standard 25 in which is secured a bushing 26 carrying a center point 27.

The tool which acts upon the work may assume various forms and is here typified by element 30 carried in the post 31 rising from the cross-carriage 32, as best shown in Figs. 1, 2 and 4. Said carriage is slidable crosswise of the machine, being mounted upon cross-ways 33 formed upon the stationary frame 34, which is bolted or otherwise fastened to the main frame and virtually constitutes a part thereof. The tool post is ad-

justable on the cross-carriage and its position thereon is controlled by the hand crank 35.

I will now describe the means by which the main spindle is rotated and the means by which the cross-carriage is caused to vibrate back and forth transversely to the axis of rotation of the spindle. For convenience, the description of these parts will commence with the driving element on the machine.

The driving element in the present instance consists of a pulley 40 fastened to the drive shaft 41 journaled in the main frame, as best shown in Fig. 4. Upon drive shaft 41 is a worm 42 which meshes with a worm wheel 43 splined upon shaft 44. Wheel 43 has elongated hubs 45, as best shown in Fig. 3 and these are journaled in bearings 46 formed upon the main frame. Said bearings are located on both sides of the wheel and the construction is such that the wheel is free to rotate but is prevented from shifting axially, while the shaft 44 is forced to rotate in unison with the worm wheel, but is free to slide axially therein. Shaft 44 is rigidly fastened to a pinion 47 which is located between two bearings 48 depending from the main carriage 3. By preference, said bearings are integral with the main carriage. Shaft 44 is journaled in said bearings 48 and travels in unison with them, having a shoulder 49 which prevents relative movement in one direction and a nut 50 which prevents it in the other. Thus, the shaft 44 travels with the carriage and drives the pinion 47 from the power derived from the non-traveling worm wheel 43.

Pinion 47 meshes with the gear wheel 52 which is rigidly fastened to the main spindle 9 and drives it. Said gear wheel is inclosed within the housing 19 as clearly shown in Fig. 3. It is thus evident that pulley 40 causes the main spindle 9 to rotate and this, in turn, by rotating the lead screw 8, causes the carriage and the parts mounted thereon to travel lengthwise of the machine.

The power shaft 41 projects through the front wall of the frame and there carries a pinion 55 which drives a gear wheel 56 fastened to a shaft 57 journaled in the stationary frame of the machine, as best shown in Figs. 1 and 4. Gear wheel 58 is rigidly fastened to shaft 57 and drives a gear wheel 59 rigidly fastened to a shaft 60. This shaft is also journaled in the stationary frame work of the machine and has on it a bevel gear 61 which meshes with a similar bevel gear 62 rigidly fastened to a cam shaft 63 which is arranged vertically and is journaled in the stationary frame. An eccentric 65 is fastened to the upper end of shaft 63 and this works in a slot 66 formed in the cross-carriage 32. The result is that when the shaft 63 rotates, it causes the cross-carriage to travel back and forth relatively to the axis of the main spindle and thereby causes the pulley to move in regular sequence toward and from the axis of the work.

In operation, when the drive pulley 40 rotates, it causes the rotation of the work, the longitudinal travel of the main carriage and the cross travel of the cross-carriage. These parts move in timed relation and so are capable of automatically producing and reproducing a piece of work which, in itself, may be of complex nature. The machine, as a whole, is strong and durable and, as previously explained, is capable of producing accurate work, especially on account of the fact that the guide surfaces of the main carriage are so long and also on account of the fact that the main spindle and lead screw are so closely associated and are arranged in line with each other. Another factor which makes for accuracy and also durability is that the lead screw is approximately midway between the two longitudinal sides of the carriage.

Attention is called to my co-pending application for lathes filed December 1, 1916, Serial No. 134,244.

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

1. A lathe having a main frame, a carriage sliding thereon, a rotatable work holder mounted on said carriage, a non-traveling power device mounted on the main frame, a shaft geared to said work holder and moving in unison with the carriage, said shaft passing through the center of said power device and making sliding connection therewith to be driven thereby, a lead screw coaxial with said work holder and connected thereto, and a stationary lead nut taking said lead screw.

2. A lathe having a main frame, a stationary nut fastened to a standard rising from said frame, a traveling carriage mounted on said main frame, said carriage being bifurcated at one end to pass to the sides of the standard, a main spindle having an axis parallel with the line of travel of said carriage, and a lead screw in line with said spindle and fastened thereto, said lead screw working in said nut for causing the carriage to travel.

3. A lathe having a main frame, a traveling carriage extending substantially from one end of said frame to the other, a standard rising from said frame and carrying the lead nut, the carriage being bifurcated at one end for noninterference with said standard, and a power device mounted on the main frame and having sliding connection with the spindle for rotating it.

4. A lathe having a main frame, provided with longitudinal ways, a carriage guided by said ways, said carriage having

a slot at one end located between the ways, a rotating main spindle carried by said carriage and arranged longitudinally approximately midway between the said ways, a lead screw in line with and fastened to said main spindle, and a standard fastened to the main frame and passing up through the slot in the carriage and carrying a nut in which the lead screw works.

5. A machine of the class described having a main frame, a main carriage traveling on it, a main spindle mounted on said carriage and traveling in unison therewith, a stationary lead nut, a lead screw working in said nut and fastened to said spindle in line therewith, a non-traveling gear wheel mounted in the main frame, a shaft splined to said gear wheel whereby the shaft may travel independently of the gear wheel and yet be rotated by it, means on the carriage for causing said shaft to travel in unison with it, and gearing connecting the said shaft with the main spindle.

6. A machine tool having a main frame supporting a main carriage, a main spindle journaled in the carriage and traveling with it, a lead nut rising from the main frame, a lead screw working in said nut and fastened to said spindle in line therewith, and means mounted in part upon the main frame and in part upon the carriage for rotating the main spindle, the end of the main carriage being bifurcated and the lead nut passing up through the bifurcation in the carriage from its point of attachment to the main frame.

7. A machine tool having an elongated frame, an elongated carriage guided upon and extending from end to end of said frame, said carriage being bifurcated approximately centrally at one end, a standard fastened to the machine frame and passing up through the bifurcation in the carriage, a lead nut at the upper end of said standard, a lead screw working in said nut, a spindle rigidly fastened to said lead screw in line therewith, a work holder fastened to said spindle, actuating means partly on the main frame and partly on the carriage for rotating said spindle and thus also causing the carriage to travel, a cross-carriage for carrying the tool, an eccentric for operating said cross-carriage, and means operating in timed relation with the rotating spindle for rotating said eccentric to move the cross-carriage toward and from the axis of the work.

In witness whereof, I have hereunto subscribed my name.

CARL G. OLSON.