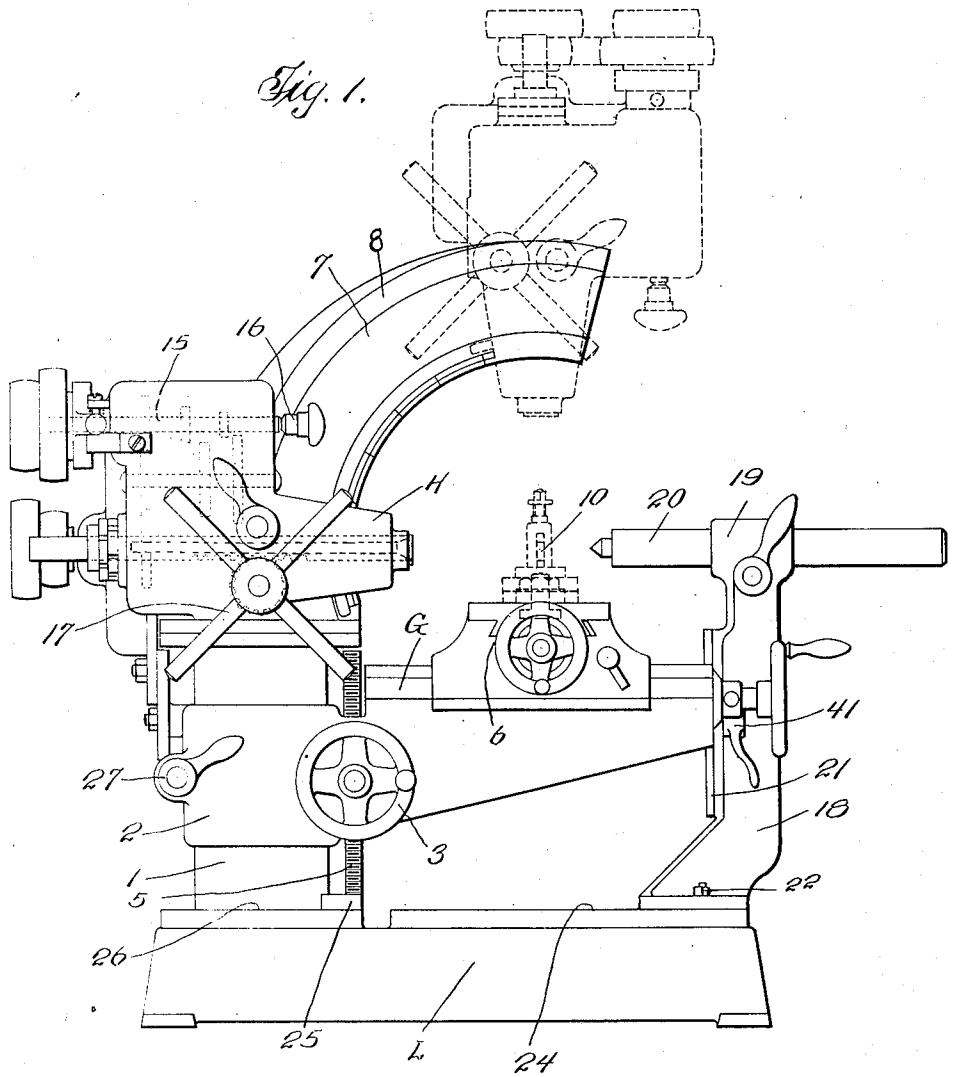
Sept. 30, 1924. 1,510,167

J. H. WILHELM

UNIVERSAL MACHINE

Filed July 14, 1921 4 Sheets-Sheet 1

Fig. 1.



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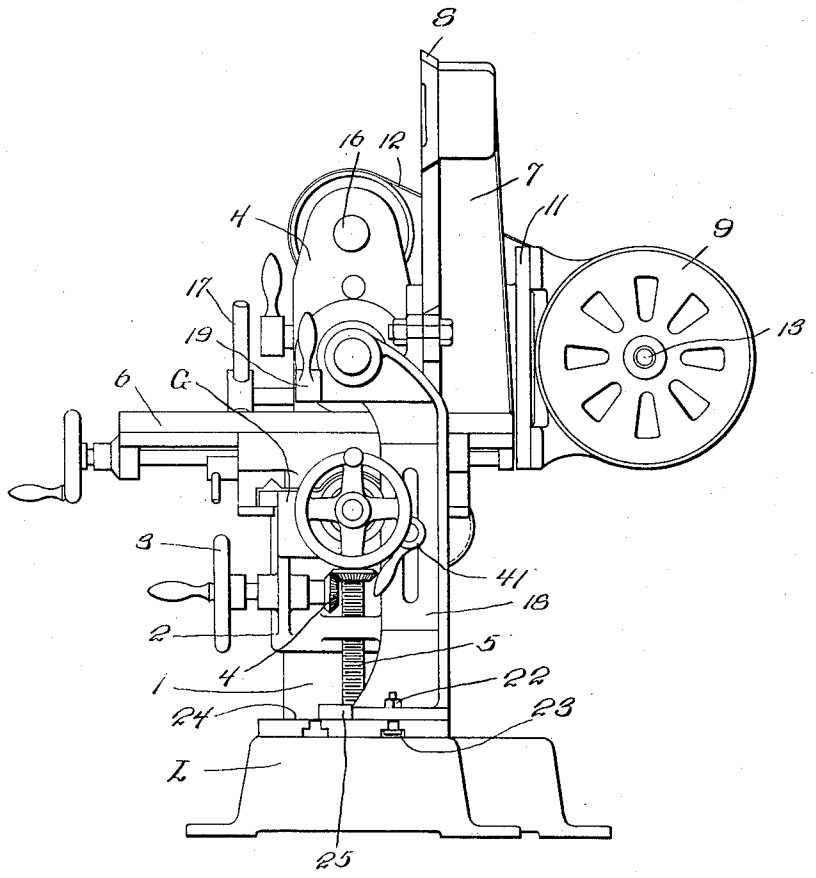
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Filed July 14, 1921 4 Sheets-Sheet 2

Fig. 2.



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UNIVERSAL MACHINE

Filed July 14, 1921 4 Sheets-Sheet 3

Fig. 5.

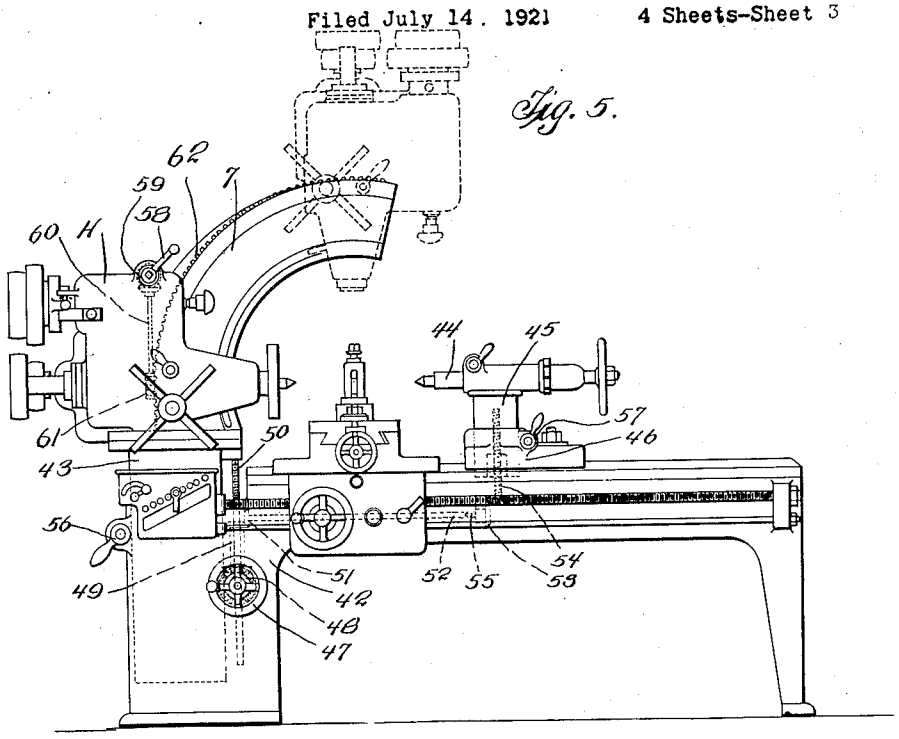


Fig. 3.

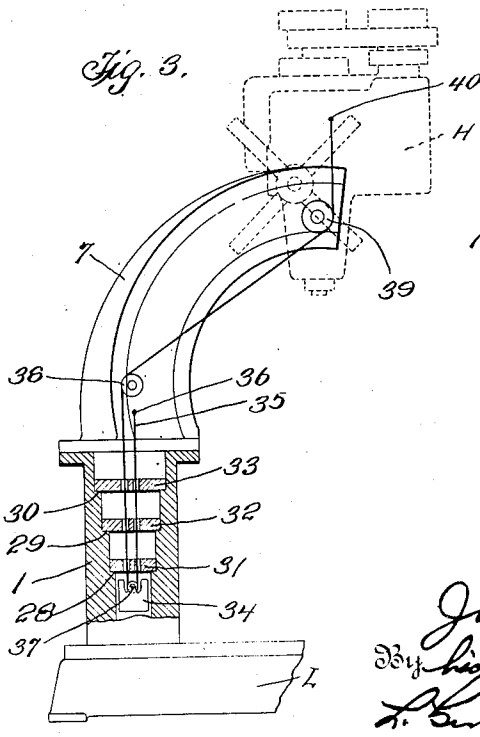
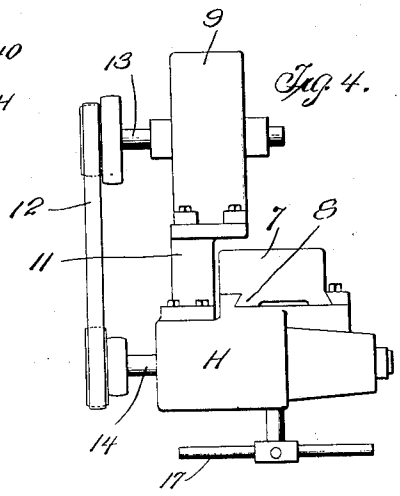


Fig. 4.



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Filed July 14, 1921 4 Sheets-Sheet 4

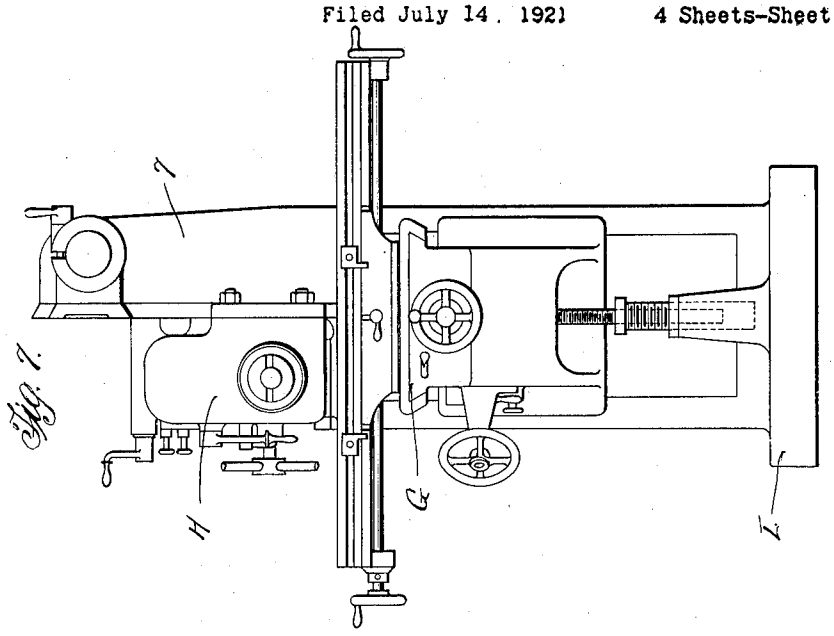


Fig. 7.

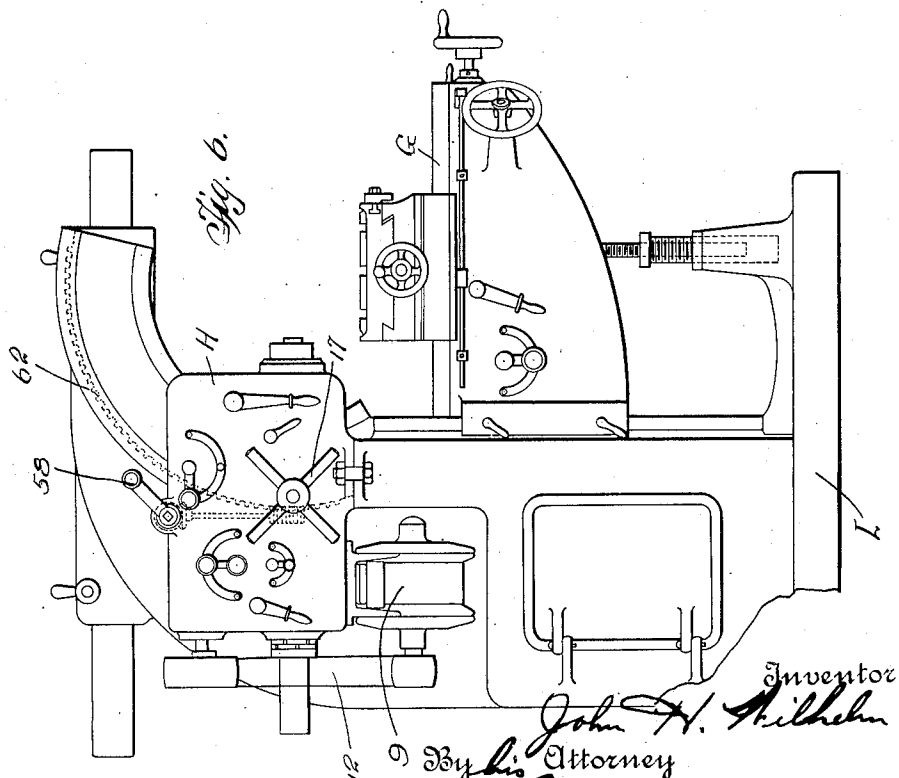


Fig. 6.

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Patented Sept. 30, 1924. 1,510,167

UNITED STATES PATENT OFFICE.

JOHN H. WILHELM, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO TRIPLEX MACHINE TOOL CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

UNIVERSAL MACHINE.

Application filed July 14, 1921. Serial No. 484,603.

To all whom it may concern:

Be it known that I, JOHN H. WILHELM, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Universal Machines, of which the following is a specification.

This invention relates to what may be termed a "universal" machine that is, to a machine in the general nature of a lathe, but consisting of elements rendering it capable of performing various machine operations, for instance, milling, boring and drilling, and of performing these in various angular positions, or directions.

A further object is to provide a structure which is simple and attractive, and yet highly efficient, for performing its different offices.

Other objects and aims of the invention, more or less specific than those referred to above, will be in part obvious, and in part pointed out in the course of the following description of the elements, combinations, arrangements of parts and application of principles, constituting the invention; and the scope of protection contemplated will be indicated in the appended claims.

In the accompanying drawings which are to be taken as a part of this specification, and in which I have shown merely a preferred form of embodiment of this invention:—

Figure 1 is a side elevational view of a machine constructed in accordance with this invention.

Figure 2 is an end view of the structure seen in Fig. 1.

Figure 3 is a diagrammatic view illustrating a counter-weight arrangement adapted for facilitating the manual movement of certain of the parts.

Figure 4 is a top plan view of a portion of the structure seen in Fig. 1, sufficient for illustrating the manner in which the motor is mounted.

Figure 5 is a side elevational view of a machine embodying certain modifications in structure as compared with the showing in the previous figures.

Figure 6 is a side elevational view illustrating a further modified construction, and

Figure 7 is an end elevational view of the structure seen in Fig. 6.

Referring to the drawings for describing in detail the structure therein illustrated, and referring first to the structure Figs. 1 to 4, the reference character L indicates a base member at one end of which rises a cylindrical column 1 upon which is vertically slidably mounted a sleeve 2 carrying a lathe bed G. The sleeve 2, and the bed carried thereby, may be slid up and down along the column 1 and for this purpose there is provided a suitable hand wheel 3 and associated gearing 4, operable upon a screw 5 so that rotation of the hand wheel will either lift the sleeve or allow it to fall, according to the direction of rotation of said wheel.

Any suitable carrying device, as 6, may be provided upon the bed G for carrying either tools or work, as occasion may require.

From the upper end of the column 1 rises a segmental standard 7 providing an arcuate guideway 8 upon which is slidably mounted a main tool carrier H, and its driving element, or motor, 9. This standard is shaped so that it curves upwardly and outwardly from the column 1 about a center such that the tool carrier H is capable of moving thru an angle of at least 90°; that is, between the horizontal position indicated by full lines in Fig. 1, and the vertical position indicated by the dotted lines in said figure, the point, as 10, indicating said center lying above the bed G so that tools carried by said tool holder may operate upon work carried by the lathe bed while said tool holder is in either its horizontal, or vertical, positions, or in any angular position intermediate its extremes. Or that work carried by the tool holder, and moved to any angular position by adjustment of the tool holder along the length of the guideway, may be successfully operated upon by a tool carried by the carrier 6 upon the lathe bed.

As clearly seen in Fig. 4, the tool carrier H is mounted in position in front of the standard 7 and carries a bracket 11 which extends to the rear of said standard and carries there the motor 9. In this way the weight of the motor and the weight of the tool holder counter-balance each other with respect to the point of support of the whole upon the standard 7 so that there is little or no tendency for said parts to bind during travel thereof along the guideway 8 of said standard.

A suitable driving connection, as for instance the belt 12, extends between the motor

shaft 13 and the drive shaft 14 of the tool holder for operating the tool holder, it being understood that operation of the motor will rotate the shaft 14 and thru said shaft will rotate the tool or other article carried by the tool holder, in the usual manner.

It may be mentioned that, if desired, any suitable form of speed changing mechanism, as indicated generally by the dotted lines 15, may be contained within the housing of the tool holder for altering the speed, or direction of rotation, of the tool, without altering the speed of the motor, said gearing to be operated, for instance, by means of a hand controlled device 16 projecting from said housing. Also, a control wheel, as 17, may be provided with which to move the tool in a direction into and out of the tool holder in the usual manner.

Rising from the base L at the end thereof, spaced from the column 1, is a standard 18 having at the upper end thereof a clamp device 19 for adjustably holding the lathe center spindle 20 so that said center may occupy a proper desired position for holding a piece of work, for instance, when the device is being used as a simple lathe.

The standard 18 has preferably provided thereon a guideway 21 with which engages the outer end of the lathe bed G, said guideway serving to guide and to steady said lathe bed while not interfering with the vertical adjustment thereof.

This standard 18 is preferably connected with the base L by means of bolts, or the like, 22, engaging within the undercut slot 23 of said base so that the standard may be readily removed entirely from the machine upon occasion, and in this connection it is to be noted that the base L provides a smooth upper surface, or table portion, 24 upon which work may be stood whenever desired. The slot, or slots 23 of said table may at these times be utilized as a convenient means for holding said work.

The lathe bed G may be readily swung in a horizontal plane about the column 1 so as not, upon occasion, to interfere with relatively large pieces of work which may be set upon the table surface 24, and for this purpose the screw 5 has its lower end resting upon a block 25 which is adapted to slide in a circular path around the annular surface 26 which is provided at the base of the column 1.

A suitable clamp device 27 is provided for retaining the lathe bed in any position to which it may be moved, either vertically, or circumferentially, of the column 1.

To facilitate the easy manual sliding movement of the tool holder and motor along the standard 7, it is desirable that a system of counter-weights be provided, and one means for providing such system is illustrated in Fig. 3, in which it will be seen that the column 1 is formed interiorly, with a plurality of ledges 28, 29 and 30, upon which rest weights 31, 32 and 33 respectively. A fourth weight, as 34, stands below the weight 28 and is supported upon a cable 35 which is attached at a stationary point 36 at the upper end of the column, and which extends downwardly thru suitable openings in the several weights, about a pulley 37 carried by weight 34 and upwardly again about pulleys 38 and 39 carried by the standard 7 to a point of attachment, as 40, upon the tool holder housing. The point of attachment, as 40, is arranged so that it stands substantially vertically above pulley 39 when the tool holder is in its uppermost position.

From this arrangement it will be seen that as the tool holder moves to the left, and begins to descend the standard, it will draw upon the cable so that the weight 34 will move upwardly and engage and lift weight 31. Then, as the tool holder continues its descent the weight 31 will engage and lift the weight 32 and the latter will in turn engage and lift weight 33. Since obviously the gravity pull of the tool holder upon the cable will gradually increase from zero, at the vertical position, to a maximum, at the horizontal position, it follows that by a proper selection of weights for the different weights 31 to 34, the pull may be adjusted to almost exactly meet the varying requirements and to thereby enable an operator to move the tool holder with equal ease regardless of the particular position in which it stands at any particular time.

A simple form of clamp device, as indicated at 41, may be provided for fixing the lathe bed G at any selected point vertically of the standard 18.

In the modification seen in Fig. 5, the structure is substantially the same as already described, except that in this instance instead of making the lathe bed vertically adjustable, said bed is made stationary as a part of a main frame 42, and the column 43, corresponding to the column 1, and carrying the segmental standard 7, is mounted to be vertically adjustable upon the main frame 42. The lathe center spindle 44 corresponding to the lathe center spindle 20 of the previous structure is mounted upon a column 45 which is vertically adjustable within a base piece 46 longitudinally adjustable along the lathe bed.

In order to simultaneously raise and lower the columns 43 and 45 any suitable mechanism may be employed. For instance, as illustrated, a hand wheel 47 may be employed, having simple bevel gear connection, as at 48, for rotating a sleeve 49, said sleeve having threaded connection with a vertical screw 50 carried by column 43 and being connected thru the medium of gears 51, shaft 52, gears 53 and screw 54 with the column

45. By these means rotation of the hand wheel 47 will rotate sleeve 49 to directly move column 43 and, thru the connections 51—54, simultaneously move the column 45.

The gears 53, of coure, have sliding engagement with shaft 52, as by means of slot 55, so as to permit free sliding movement of the base piece 46 along the lathe bed.

Clamp devices, as 56 and 57, may be provided for holding the columns 43 and 45 respectively in their adjusted positions.

As a convenient means for moving the tool holder H back and forth along the segmental standard, an operating handle 58 may be provided having gear connection, as 59, with a short shaft 60. These parts are carried by the tool holder and operate a worm 61 which is arranged to engage the teeth of a segmental rack 62 carried by said standard. By this arrangement the tool holder may be easily moved to any desired position and will remain practically locked in said position until purposely again moved thru the medium of the handle 58.

It will be understood that the counterbalancing device as heretofore described with respect to Fig. 3, may be employed in the present structure if desired.

In the modifications Figs. 6 and 7, a structure is shown which is very similar to the structure Fig. 1, and is given merely to illustrate a possible form of construction which may be resorted to in the building of a machine for very heavy work.

As many changes could be made in this construction without departing from the scope of the invention as defined in the following claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative only and not in a limiting sense.

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

1. A universal machine comprising a lathe bed, a tool holder and a lathe center spaced apart longitudinally of the lathe bed and spaced above the upper surface of said bed, a column at the upper end of which said tool holder is mounted, means whereby the lathe bed is vertically adjustable longitudinally of said column, a standard at the upper end of which said center is mounted, and said lathe bed having sliding engagement with said standard to steady said lathe bed.

2. A universal machine comprising a lathe bed, a tool holder and a lathe center spaced apart longitudinally of the lathe bed and spaced above the upper surface of said bed, a column at the upper end of which said tool holder is mounted, means whereby the lathe bed is vertically adjustable longitudinally of said column, a standard at the upper end of which said center is mounted, said lathe bed having sliding engagement with said standard, and clamp means interengaging between the lathe bed and said standard to hold the lathe bed in any selected position of vertical adjustment relative to said standard.

3. A universal machine comprising a lathe bed, a tool holder, a column at the upper end of which said tool holder is mounted, and means whereby the lathe bed is vertically adjustable longitudinally of said column, the connection between said lathe bed and said column being of a character to permit swinging movement of the lathe bed about said column, substantially for the purpose set forth.

4. A universal machine comprising a lathe bed, a tool holder, a column at the upper end of which said tool holder is mounted, mountings whereby the lathe bed is vertically adjustable longitudinally of said column and also movable angularly in relation thereto, and means whereby the tool holder may be adjusted to various angular positions with respect to the lathe bed.

5. A universal machine comprising a lathe bed, a tool holder, a column at the upper end of which said tool holder is mounted, mountings whereby the lathe bed is vertically adjustable longitudinally of said column and also movable angularly in relation thereto, and a segmental standard continuing from the upper end of said column to which the tool holder is slidably connected to move therealong into various angular positions with respect to the lathe bed.

6. A universal machine comprising a lathe bed, a tool holder and a segmental standard to which said tool holder is connected and along which the tool holder may be slid to different angular positions with respect to the lathe bed, a motor for driving said tool holder, and said tool holder and motor being arranged at opposite sides of said standard in substantially balanced relation, for the purpose set forth.

7. A universal machine comprising a lathe bed, a tool holder and a segmental standard to which said tool holder is connected and along which the tool holder may be slid to different angular positions with respect to the lathe bed, and counter-balancing means for facilitating movement of the tool holder along said standard, and means controllable by the operator for locking the tool holder and counterbalance in fixed position.

8. A universal machine comprising a lathe bed, a tool holder and a segmental standard to which said tool holder is connected and along which the tool holder may be slid from a horizontal position at one end of said lathe bed to a position vertically above the lathe bed, and variable

counter-balancing means for counter-balancing the weight of said tool holder as said tool holder moves between its horizontal and its vertical positions, substantially as described.

9. A universal machine comprising a lathe bed, a tool holder and a segmental standard to which said tool holder is connected and along which the tool holder may be slid from a horizontal position at one end of said lathe bed to a position vertically above the lathe bed, variable counter-balancing means for counter-balancing the weight of said tool holder as said tool holder moves between its horizontal and its vertical positions, said counter-balancing means comprising a plurality of weights, and means whereby said weights are lifted successively one after the other.

10. A universal machine comprising a lathe bed, a tool holder, supporting means for said tool holder of a character permitting adjustment of the tool holder to various angular positions with respect to the lathe bed and along an arcuate path extending from one end of the lathe bed upwardly and toward the opposite end of the lathe bed, and means whereby the lathe bed is also adjustable with respect to said supporting means.

11. A universal machine comprising a lathe bed, a tool holder, supporting means for said tool holder of a character permitting adjustment of the tool holder to various angular positions with respect to the lathe bed and along an arcuate path extending from one end of the lathe bed upwardly and toward the opposite end of the lathe bed, and means whereby the lathe bed is adjustable with respect to said supporting means in an arcuate path extending horizontally transverse of the length of the lathe bed.

12. A universal machine comprising a lathe bed, a tool holder, supporting means for said tool holder of a character permitting adjustment of the tool holder to various angular positions with respect to the lathe bed and along an arcuate path extending from one end of the lathe bed upwardly and toward the opposite end of the lathe bed, and means whereby said lathe bed is both vertically and horizontally adjustable with respect to said supporting means, the horizontal adjustment being in an arcuate path.

13. A universal machine comprising a lathe bed, a tool holder, supporting means for said tool holder of a character permitting adjustment of the tool holder to various angular positions with respect to the lathe bed and along an arcuate path extending from one end of the lathe bed upwardly and toward the opposite end of the lathe bed, said supporting means comprising a cylindrical standard and means whereby the lathe bed is both vertically and rotatably adjustable upon said standard.

14. A universal machine comprising a lathe bed, a tool holder, supporting means for said tool holder of a character permitting adjustment of the tool holder to various angular positions with respect to the lathe bed and along an arcuate path extending from one end of the lathe bed upwardly and toward the opposite end of the lathe bed, said supporting means comprising a cylindrical standard, means whereby the lathe bed is both vertically and rotatably adjustable upon said standard, a lathe center, and a support for the lathe center to which the lathe bed is also adjustably connected.

15. A universal machine comprising a lathe bed, a tool holder, supporting means for the tool holder of a character permitting the adjustment of the tool holder to various angular positions with respect to the lathe bed, said supporting means serving also to support the lathe bed and comprising a cylindrical standard upon which the lathe bed is rotatably adjustable in a horizontal plane, a lathe center spaced away from the tool holder, a second standard upon which the lathe center is mounted and supported, and means for fixing the lathe bed to said second standard in various positions of horizontal adjustment to which the lathe bed is moved.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN H. WILHELM.

Witnesses:

L. GESSFORD HANDY,

MAY SCHULZ.