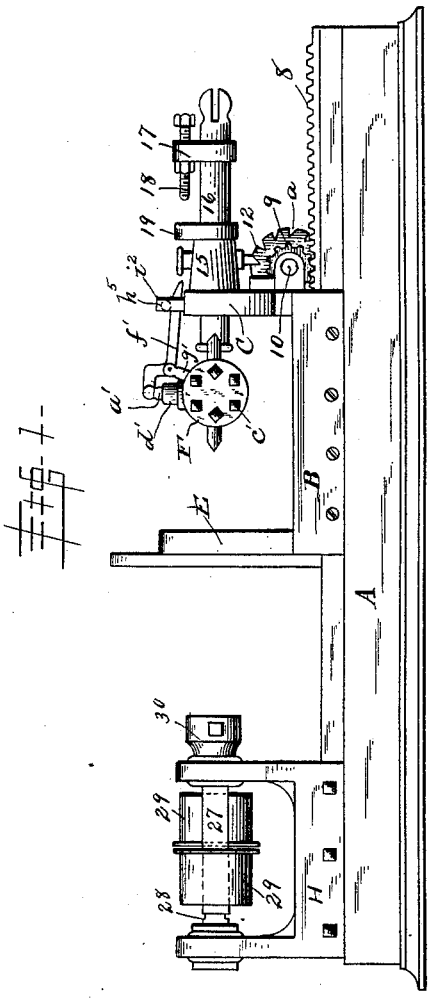
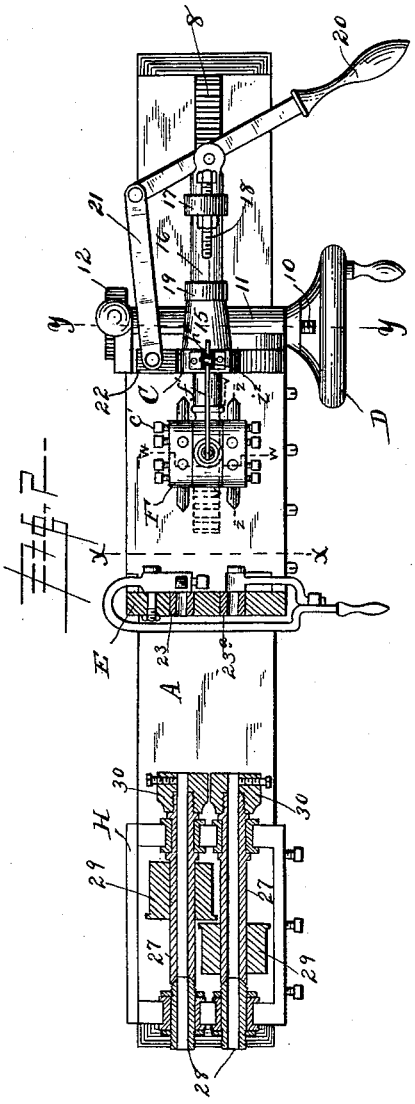
(No Model.) 3 Sheets—Sheet 1.

E. LINDNER.

TURNING LATHE.

No. 452,495. Patented May 19, 1891.





WITNESSES:

W. E. Bowen

Benj. Miller.

INVENTOR:

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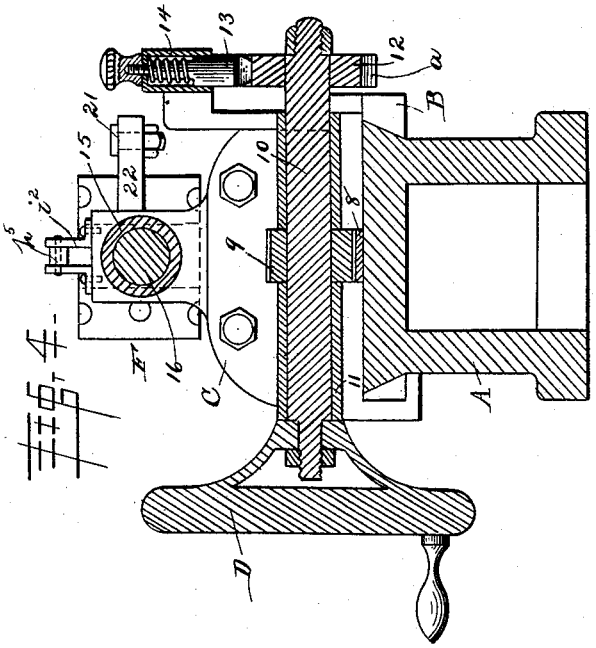
Attorney.

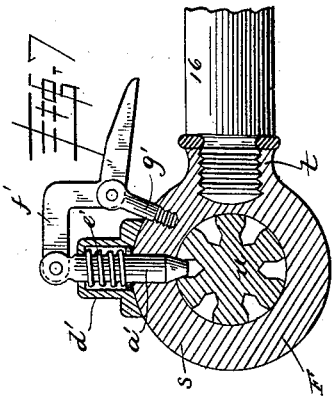
(No Model.) 3 Sheets—Sheet 2.

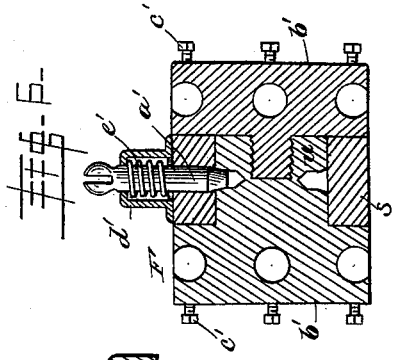
E. LINDNER.

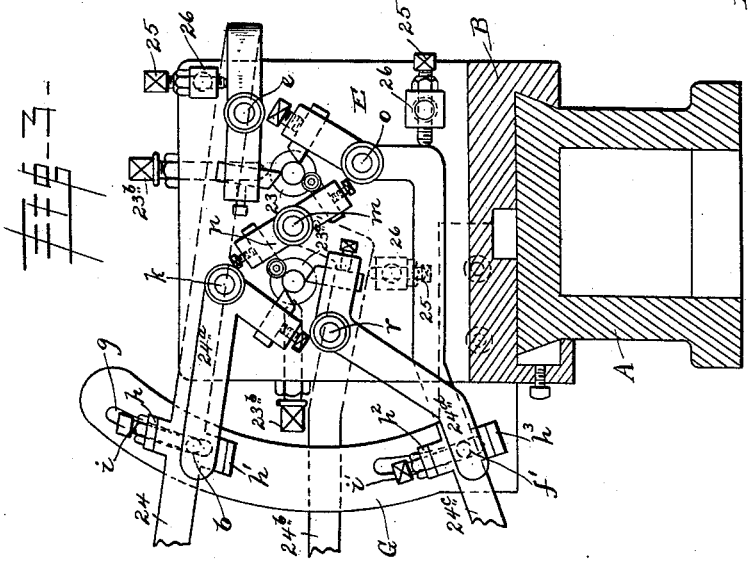
TURNING LATHE.

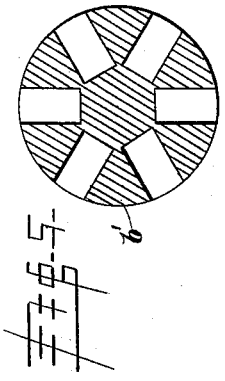
No. 452,495. Patented May 19, 1891.











WITNESSES:

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(No Model.) 3 Sheets—Sheet 3.

E. LINDNER.

TURNING LATHE.

No. 452,495. Patented May 19, 1891.

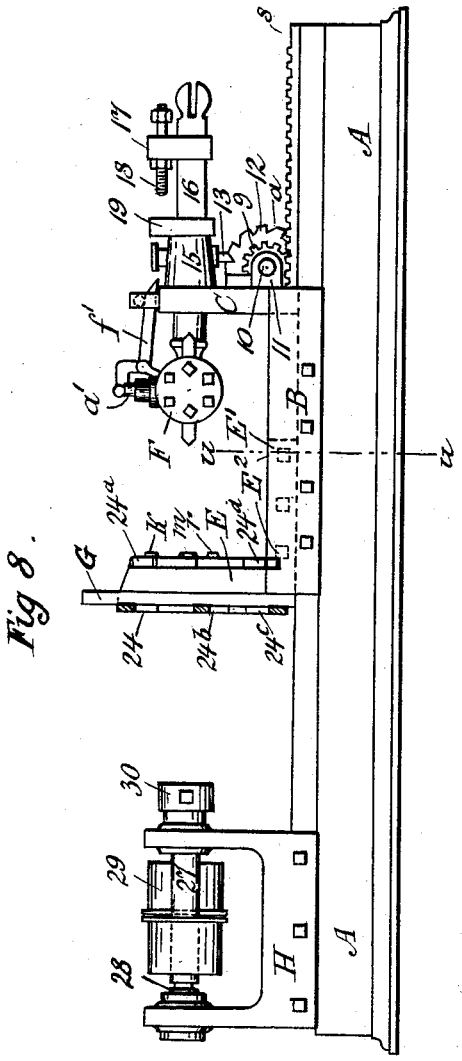

Fig 8.

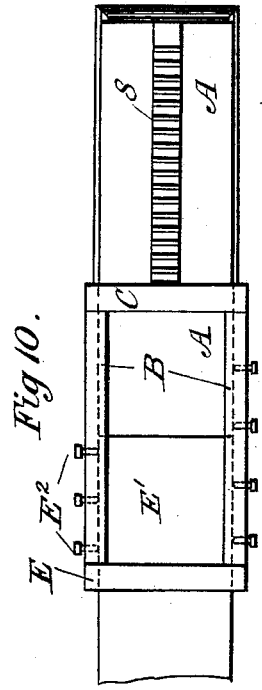

Fig 10.

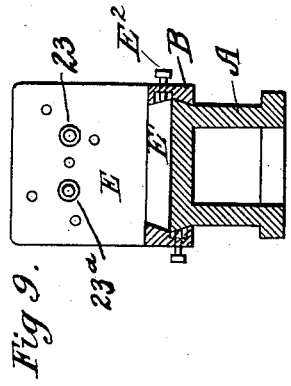

Fig 9.

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UNITED STATES PATENT OFFICE.

ERNST LINDNER, OF NEW YORK, N. Y., ASSIGNOR TO LINDNER & REMIG, OF SAME PLACE.

TURNING-LATHE.

SPECIFICATION forming part of Letters Patent No. 452,495, dated May 19, 1891.

Application filed August 18, 1890. Serial No. 362,355. (No model.)

To all whom it may concern.

Be it known that I, ERNST LINDNER, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Turning-Lathes, of which the following is a specification.

This invention has reference to turning-lathes of that class known as "hollow live-spindle lathes" or "screw-machines."

In my Letters Patent dated January 31, 1888, No. 377,080, there is illustrated a lathe embodying certain features of construction whereby lathes of the type improved are rendered capable of performing a variety of work in a rapid manner. My present invention embodies the leading features of the said patented machine, with certain changes and improvements having for their object to largely increase the capacity of the machine and to render lathes of the character in question capable of simultaneously making articles of dissimilar constructions or more than one article of the same construction.

In carrying out my invention I make use of but a single lathe-bed, a single live head-stock, and a single sliding tail-stock. The head-stock, however, is equipped with two live-spindles, and the sliding tail-stock is provided with an upright flange equipped with means for supporting two rods or bars carried by the live-spindles, and also with a peculiarly-organized system of levers for carrying a series of tools for operating upon the surfaces of the several articles and severing the same, when completed, from the bars or rods held by the spindles of the head-stock. The dead-spindle of the tail-stock is provided with a duplex chuck so constructed as to carry tools necessary for machining two rods or bars of material simultaneously and for maintaining said tools in the required positions for acting on the metal rods or bars from which the articles are being made.

To enable those interested in the art to which my invention relates to construct and make use of the same I have hereinafter explained in detail its several features and their mode of operation, and in claims at the end of this description I have set out the novelty for which Letters Patent are desired.

In the accompanying drawings, which form part of this specification, and in which like parts are indicated by like letters and figures of reference in the several views, Figure 1 represents a side elevation of a portion of a turning-lathe embodying certain features of my invention. Fig. 2 is a top plan view of Fig. 1 with certain parts in section and embodying certain details not seen in Fig. 1. Fig. 3 is a cross-section on the line $x\ x$ of Fig. 2, showing a face view of the upright flange of the sliding tail-stock upon which the system of levers hereinafter described is mounted. Fig. 4 is a cross-section on the line $y\ y$ of Fig. 2. Fig. 5 is a section through the chuck on the line $z\ z$ of Fig. 2, the tools being removed from the chuck. Fig. 6 is a section through the chuck on the line $w\ w$, and Fig. 7 a section on the line $v\ v$ of Fig. 2. The sectional views, Figs. 3 to 7, are made on an enlarged scale in order to more plainly show the parts which they illustrate. Fig. 8 represents a side elevation of a turning-lathe embodying additional features of my invention. Fig. 9 is a section along line $u\ u$ of Fig. 8 showing the vertical flange E, but without the levers and tools connected therewith. Fig. 10 is a ground plan of that part of Fig. 8, containing the lathe-bed with the sliding tail-stock and the flange E, (check-levers, tools, and other attachments being omitted,) provision being made for varying the distance between said flange and said tail-stock, this being the distinguishing feature between Figs. 8, 9, and 10, as compared with Figs. 1, 2, 3 and 4.

Referring to the drawings, A indicates the lathe-bed of the usual construction. It is provided, however, centrally on its upper surface with a cog-rack 8 of the required length which co-operates with pinion 9, which is mounted on a shaft 10, supported in bearing 11, fixed to or formed with the upright flange C, rising from the rear end of the sliding tail-stock B. A hand-wheel D, (omitted from Figs. 1 and 8,) attached to one end of shaft 10, is employed to give motion to said shaft to move the tail-stock B forward and backward on the lathe-bed. Fixed to the opposite end of shaft 10 is an indexing and gaging wheel or disk 12 (which is interchangeable with like disks having teeth of varying dis-

tances apart to provide feeds of different lengths,) provided on its periphery with ratched teeth *a* at equal or varying distances apart, according to the work to be performed, into which teeth the beveled lower end of the spring-actuated bolt 13 is adapted to catch. The bolt 13 slides vertically in a bearing-box 14, fixed to the upright flange C of the sliding tail-stock B, as seen in Fig. 4. By this arrangement a progressive feeding, gaging, and locking mechanism is provided. The wheel or disk 12 with its ratchet-teeth and the co-operating beveled bolt provide an effective locking means. It will be observed that the spring-actuated bolt 13 is so mounted that it is immediately to the right of the axis of the shaft 10, and the teeth *a* are preferably so cut in the disk or wheel 12 that the surface of the tooth, on which the bolt 13 slides when the disk is turned to feed the tail-stock forward is at an acute angle to the opposite surface. This facilitates the disengagement of the bolt from the tooth. When the bolt is in the tooth the disk 12 is securely locked against movement, as indicated in Fig. 1. It will be understood, of course, that as the shaft 10 is revolved the pinion 9 engaging with the cog-rack 8 will cause the tail-stock B to advance, and simultaneously therewith the index-disk 12, fixed to the same shaft as pinion 9, will revolve and elevate the bolt 13 and transfer it to the next succeeding tooth of the disk 12, thus gaging the advance of the sliding tail-stock and locking it in its advanced position. When the tail-stock is required to be moved backward, the locking-bolt 13 is held up by any suitable mechanism or by hand to avoid the teeth of disk 12 while the hand-wheel D is revolved in the proper direction.

The base of the sliding tail-stock B is provided on its under side with guiding grooves or flanges, as shown, to keep it in position on the bed A. The rear end of the tail-stock B is provided with the upright flange C, already mentioned, and near its front end is provided the upright flange E, which is shown in Figs. 1, 2, and 3 to be rigidly connected with said sliding tail-stock, while in Figs. 8, 9, and 10 said flange E is provided with a horizontal base E′, which is dovetailed into guiding-grooves within such tail-stock, as more particularly shown in Fig. 9.

E^2 E^2 in Figs. 8, 9, and 10 are screw-bolts passing through the outer bars of the tail-stock, which bars serve as guides for said base E′. After the distance between flanges E and C has been properly adjusted according to the length of the pieces which are to be shaped said bolts E^2 E^2 are to be used as set-screws for confining base E′ and with it flange E in their proper positions. As the problem involved in adjusting a movable flange E with its base E′ on the tail-stock B refers to well-known mechanical appliances not involving invention, no special auxiliary mechanism is shown in Figs. 8, 9, and 10 for varying the distance between flanges C and E. These flanges rise to suitable heights, and flange C is provided at its top with a hub or bearing 15, in which the tool-stock or dead-spindle 16 is adapted to slide. To the dead-spindle 16 there is fixed a collar 17, having passed therethrough an adjustable screw 18, which is adapted to come in contact with a second collar 19, fixed to the hub or bearing 15, and thus limit the movement of the dead-spindle. The dead-spindle 16 is operated by the hand-lever 20, which is pivoted to the rear end of said spindle and connected by a link 21 to the projection 22 of the upright flange C, as shown in Figs. 2 and 4, the lever being omitted from Figs. 1 and 8.

The front end of the tool-stock or dead-spindle 16 is screw-threaded or otherwise constructed to receive a chuck, as F. The chuck shown in the drawings, and which is new in itself and will be made the subject of a separate application for patent, is particularly adapted for employment when the machine is to be used for making simultaneously two dissimilar articles. When the articles to be made are all of the same nature, a duplex chuck not capable of being revolved may be substituted for the chuck herein shown; or, in lieu of either of the chucks mentioned, any suitable construction of chuck that may be revolved by hand or otherwise to bring the desired tools successively into operation may be made use of.

The upright flange E at the front end of the sliding tail-stock is provided with two circular socket-holes to receive and hold in position in line with the axes of the lathe-spindles of the live head-stock the interchangeable bushings 23 23^a, which receive and support the rods or bars of material to be operated upon. These bushings 23 23^a perform the functions of journal boxes or bearings for said rods or bars as the latter revolve when being acted upon by the tools carried by the dead-spindle 16. The bushings 23 23^a are held in place by means of screws and jam-nuts 23^b. (Seen in Fig. 3.) To this upright flange E is pivoted a series of tool-carrying devices consisting of levers 24 24^a 24^b 24^c 24^d, the short arms or inner ends of which are so constructed as to receive and hold the various forming and severing tools employed in the operations of the lathe. The lever 24 is pivoted by its short arm at *e* to the face of flange E. Its long arm being bent to extend along the back of said flange E is provided near its outer end with a pin *b*, operating in a slot *g*, made in a curved plate G, fixed to the front edge of upright flange E, said slot being concentric with pivot *e* of the lever. The long arm of lever 24 is also provided with lateral extensions having lugs *h h′*, as shown. Through one of these lugs *h* passes screw-bolt *i*, provided with a jam-nut, the function of which screw-bolt is to adjust the lever 24^a, the said lever being pivoted to the face of flange E at *k*. The outer end of the long arm of this lever 24^a is depressed in the operation

of lever 24 by the screw-bolt *i* pressing against it, as will be understood from Fig. 3, and it is lifted by coming in contact with the lower lug *h'* on extension of lever 24. By this arrangement the levers 24 24ª are adapted to move in unison, thereby simultaneously carrying the tools fixed in their short arms toward or away from the axes of the bearings 23 23ª. The lever 24ᵇ is pivoted to the back of flange E at *m*, and on the face of said flange E there is fixed to the same pivot *m* the straight piece *n*. This piece *n* is also a tool-carrying device, and is so fixed to the pivot *m* as to bring its respective ends in such relation to the bearings 23 23ª as that when the lever 24ᵇ is depressed the tools carried by said piece *n* will be simultaneously advanced to the same extent toward the axes of bushings or bearings 23 23ª. The lever 24ᶜ is pivoted at *o* to the face of the flange E. Its outer end is provided with a pin *f'* and with lateral extensions provided with lugs h^2 h^3, said pin operating in a slot made in the lower part of plate G and being concentric with the pivot *o*, and the lug h^2 receiving a screw *i'* for adjusting the lever 24ᵈ, the lower lug h^3 serving to lift the outer end of the last-mentioned lever when the lever 24ᶜ is raised from its depressed position. The lever 24ᵈ is pivoted at *r* to the face of flange E. The inner ends of levers 24ᶜ 24ᵈ are provided with tools, as shown, and when the outer end of the former lever is depressed the inner ends of both levers 24ᶜ 24ᵈ are advanced simultaneously and uniformly toward the axes of the bushings 23 23ª precisely in the manner explained when describing the operation of levers 24 24ª.

From the above description it will be seen that there are five levers operated by means of those handles and six operating-tools acting in pairs. The movements of the tools toward the axes lines of the bushings are arrested by the adjustable stop-screws 25, secured to upright flange E by lugs 26, as seen in Fig. 3, such movements taking place when the hand ends of the respective levers are pressed downward. Any means may be made use of for clamping or fixing in place on the short arms or inner ends of the levers the operating-tools, provided such means admit of the adjustment of the tools toward or from the axes of the bushings 23 23ª, so that the tools may be set to cut the articles being made the desired depth. Any one set of these tools may be set to simply skim the surface of the material being fashioned, another set to groove, bead, or otherwise finish the surface of the articles, and the third set to sever the completed articles from the rods or bars. The several levers are so bent as to bring their outer ends to the front of the sliding tail-stock B in a position convenient for operating and so as not to interfere with each other.

The live head-stock H in my present organization is fitted with two spindles 27 and steps 28, made hollow to permit the rods or bars of material to be worked to be passed through the same, and are provided with pulleys 29, as shown, to receive the driving-belts. At their front ends the spindles 27 are fitted with adjustable chucks or couplings 30 for clamping the material to be worked, so that it will revolve with the spindles.

The chuck F (shown by enlarged details in Figs. 5 to 7) comprises a ring *s*, having an internally-screw-thread projection *t*, by means of which the chuck is secured to the dead-spindle 16, as seen in Fig. 7, an interior hub *u*, provided with a series of holes in its periphery, into which the spring-actuated bolt *a'* is adapted to seat to lock the hub stationary within ring *s*, and tool-sockets *b'*, formed integral with hub *u* or separately and fixed thereto, so as to revolve with said hub. The tool-sockets *b'* are provided with holes in their peripheries to receive the tools, which are held against displacement by means of screws *c'*, as indicated in Fig. 2. On top of ring *s* there is secured the cap *d'*, which incloses the spring *e'*, encircling the bolt *a'*. To the outer end of bolt *a'* there is pivotally connected one end of the bent lever *f'*, fulcrumed on screw *g'*, which is fixed in the top of ring *s*, the opposite or free end of said lever *f'* being beveled and adapted to slide beneath roller h^5 in supports i^2 on top of upright flange C. (See Figs. 2, 4, and 7.) It will be understood that as the dead-spindle 16 is drawn back by means of lever 18 for the purpose of readjusting the tool-sockets of the chuck to bring into operative positions different tools the beveled free end of lever *f'* will slide beneath roller h^5, with the effect of lifting bolt *a'* out of the hole of hub *u*, thus permitting the tool-sockets to be turned by hand. When the desired tools have been brought to the front, the reverse movement of lever 20 will carry the dead-spindle 16 and the attached chuck outward until the movement is checked by screw 18 coming in contact with the collar 17 on the hub 15, as before explained.

The chuck F will preferably be used when articles are being made which require more than one operation of tool-supports in the chuck to complete them, since such construction of chuck admits of the rapid and easy adjustment of several different characters of tools to the work in hand without the removal of the chuck from the dead-spindle.

It is obvious that by the employment of my duplex chuck in a machine of the construction herein shown, and fitting it with the required tools appropriately disposed in its tool-sockets, two dissimilar articles may be made simultaneously and two similar articles may also be made simultaneously. A stationary duplex chuck may be used when the machine is making articles of one description, and with such a chuck two articles may be produced simultaneously with precisely the same movements of the parts as have been heretofore required to produce a single article. If but one article is desired to be made at one operation, that may be accomplished with the

same ease as when employing the old type of machine by omitting from one live-spindle the bar or rod to be worked or removing the tools from one of the tool-sockets and from certain of the levers of flange E.

In the operation of the lathe the spindles 27 are fitted with rods or bars of the metal from which the articles desired are to be made, the said rods or bars passing through the spindles and into the bushings 23 23^a, fixed in the upright flange E of the sliding tail-stock B, as explained. The bushings 23 23^a are of proper size, adapting them to perform the functions of journal boxes or bearings for the rods or bars of metal, the rods or bars being clamped to the spindles 27, so as to revolve with said spindles. When the spindles 27 are revolved, the tools (such as drills, taps, &c.) carried by the chuck fixed to the front end of the dead-spindle 16, carried by the sliding tail-stock B, are advanced against the butt-ends of the rods or bars of metal by pulling the hand-lever 20 until motion is arrested by the screw 18 coming in contact with the collar 17, fixed to the hub 15, through which the dead-spindle slides. When the desired operation has been performed by the tools of the chuck, the tools held by the levers 24 24^a 24^b 24^c 24^d, supported on upright flange E, are advanced to do their work in the manner hereinbefore explained, the last set of tools operated acting to sever the finished articles from the rods or bars. The sliding tail-stock B is then advanced toward the spindles 27 by means of the described feeding and gaging mechanism, thus advancing the required lengths of the bars or rods through the bushings 23 23^a to make another complete article, this operation being repeated until the sliding tail-stock B has progressed to the spindles 27, when the rods or bars are unclamped, the sliding tail-stock moved back to the end of the lathe-bed, and the rods or bars again adjusted and clamped for another series of operations.

This machine may also be employed for giving ornamental conformation to the surfaces of rods or bars of considerable length. When used for such purpose, the dead-spindle and its chuck are not employed. The rods or bars are clamped in the live-spindles with their front ends supported in the bushings 23 23^a of upright flange E, and as the live-spindles are revolved the tools which are carried by the short arms of the levers supported on said flange E, are by means of the levers which carry them, advanced toward the axes of the bushings 23 23^a to operate on the bars or rods. After one pair of tools has performed its work the other pairs are advanced successively in proper order to do their work, and when the sections of bars or rods operated on have been finished the sliding tail-stock is advanced toward the spindles 27, in the manner herein stated, to present other sections of the rods or bars to be finished. In this manner the entire surfaces of both rods or bars are finished, it being necessary, of course, to unclamp the rods or bars to advance them through the spindles 27 when the sliding tail-stock has been advanced as far as it is adapted to go toward the fixed head-stock H. There will be suitable supports for the long rods or bars at both ends of the same during the operation of machining them.

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

1. In a turning-lathe, the combination, with a lathe-bed, a head-stock supporting two live-spindles, and an upright flange E, provided with two bushings, as 23 23^a, of a tool-carrying device supported on said flange and provided with an arm carrying a fixed machining-tool for operating on a bar or rod to be supported in one of said bushings, and a second arm adjustably connected with said tool-carrying device, and carrying a fixed machining-tool for operating on a bar or rod to be supported in the other of said bushings, substantially as set forth.

2. In a turning-lathe, the combination, with a lathe-bed, a head-stock supporting two live-spindles, and an upright flange E, provided with two bushings, as 23 23^a, of a lever carrying a fixed machining-tool for operating on a bar or rod to be supported in one of said bushings, and also provided with an arm adjustably connected therewith and carrying a fixed machining-tool for operating on a bar or rod to be supported in the other of said bushings, substantially as set forth.

3. In a turning-lathe, the combination, with the head-stock which carries the live-spindles, and a tail-stock adjustably supported on the lathe-bed, of an upright flange, as E, mounted on the tail-stock and provided with a pair of rod or bar supporting bushings, a lever, as 24^b, pivoted to flange E, said pivot being equal distances from the axes of said bushings, and a tool-carrying device connected to the pivot of said lever to move with the lever, and provided in its ends with machining-tools, which are simultaneously advanced toward the axes of the bushings when the handle of the lever is operated, substantially as set forth.

4. In a turning-lathe, a lathe-bed, a sliding tail-stock and mechanism for progressively moving said tail-stock on the lathe-bed, a dead-spindle equipped with a suitable tool-chuck and mounted on the sliding tail-stock, and a tool-carrying device mounted on an upright flange supported by said lathe-bed and made separate from the tail-stock, so as to be adjustable in its position with reference to said tool-chuck, all combined with a head-stock containing a live-spindle, substantially as set forth.

5. The combination, with the lathe-bed, the head-stock supporting the live-spindles, and the sliding tail-stock carrying the upright flange E, which is provided with bushings, as 23 23^a, and with plate G, of a lever, as 24, car-

rying a fixed machining-tool operating on a bar or rod supported in one of said bushings, and a second lever, as 24^a, adjustably connected with the first-named lever and carrying a second fixed machining-tool for simultaneously operating on another bar or rod supported in the other of said bushings, substantially as set forth.

6. The combination, with the lathe-bed, a head-stock provided with live-spindles, as 27, and a sliding tail-stock provided with an upright flange supporting the dead-spindle and the tool-chuck, and also provided with a second upright flange, as E, carrying plate G, and bushings, as 23 23^a, of a series of levers 24 24^a 24^b 24^c 24^d, pivoted to said flange E so as to present their inner ends, which carry machining-tools, in operative relation to the axes of the bushings 23 23^a, the handle end of lever 24 provided with a pin operating in a slot of plate G, concentric with the pivot of said lever, and also with lugs, as h h', to secure an adjusting-screw, as i, and to lift the handle end or lever 24^a, whereby said levers 24 24^a operate in unison, and the handle ends of levers 24^c and 24^d similarly supported on plate G, in order that said levers may likewise act in unison, their inner ends, as well as the inner end of lever 24^b, also fitted with machining-tools, which are adapted to be advanced toward the axes of the bushings 23 23^a when the handle ends of said levers are depressed, substantially as set forth.

7. The operating-levers fitted with machining-tools, as explained, and mounted on the upright flange E of the tail-stock B, four of said levers 24 24^a and 24^c 24^d so supported as to operate in pairs to simultaneously advance their fixed machining-tools in pairs toward the axes of the bushings which support the rods or bars to be operated upon, and the remaining lever 24^b carrying at its inner end on its supporting-pivot the piece o, in the ends of which are fixed machining-tools, which are adapted when the handle end of said lever is depressed to be advanced simultaneously toward the axes of the aforesaid bushings, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 31st day of May, A. D. 1890.

ERNST LINDNER.

Witnesses:
J. E. M. BOWEN,
T. H. PALMER.