No. 672,872. Patented Apr. 23, 1901.

B. DREYER.

MACHINE FOR TURNING SHAFTING.

(Application filed May 3, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

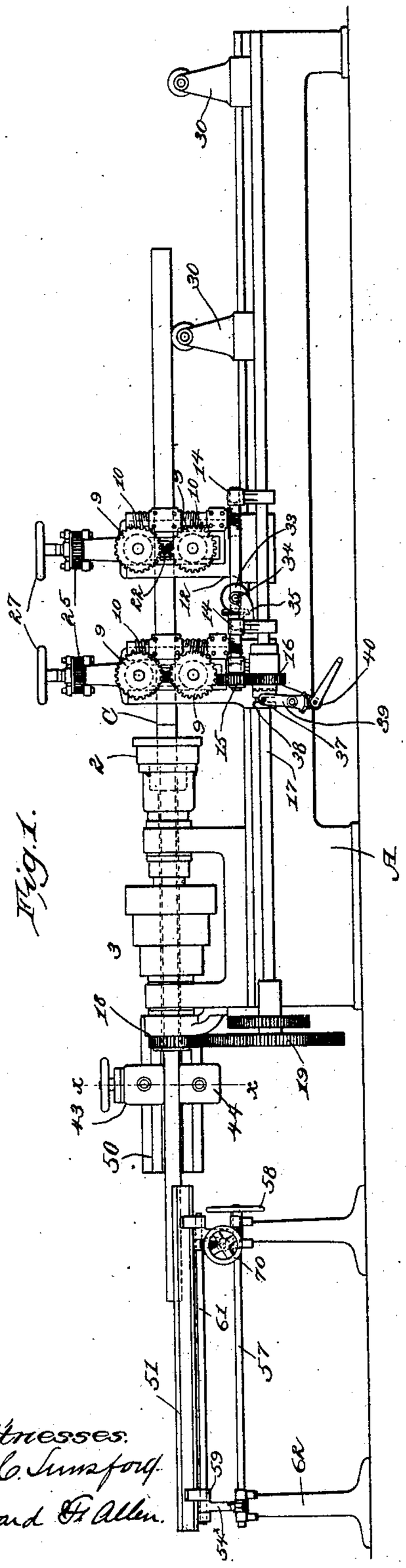


Fig. 6.

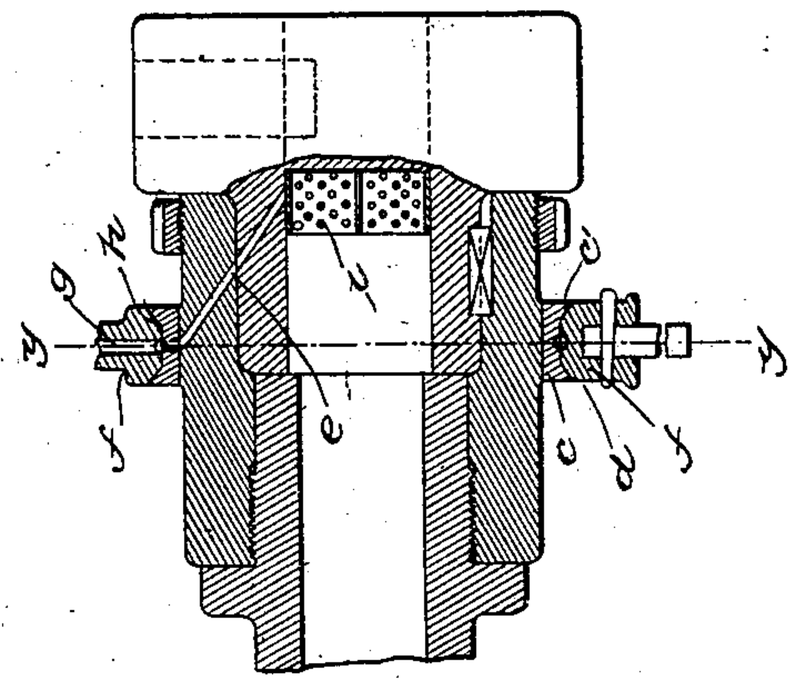


Fig. 5.

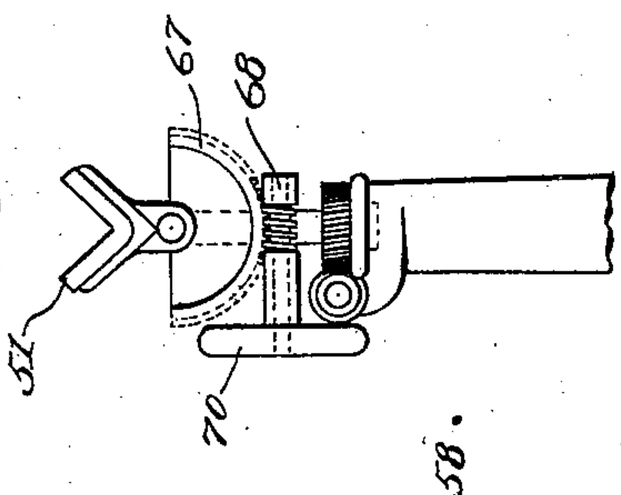
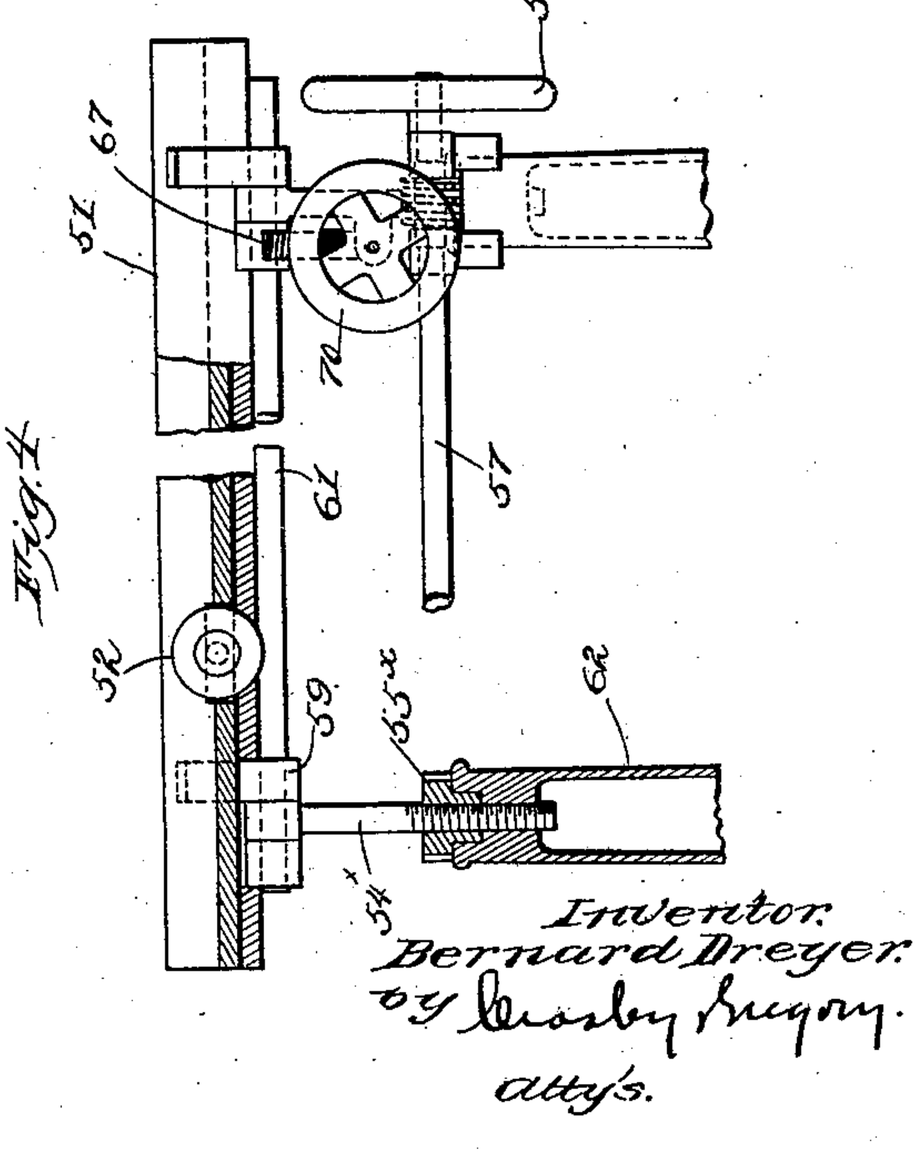


Fig. 4.



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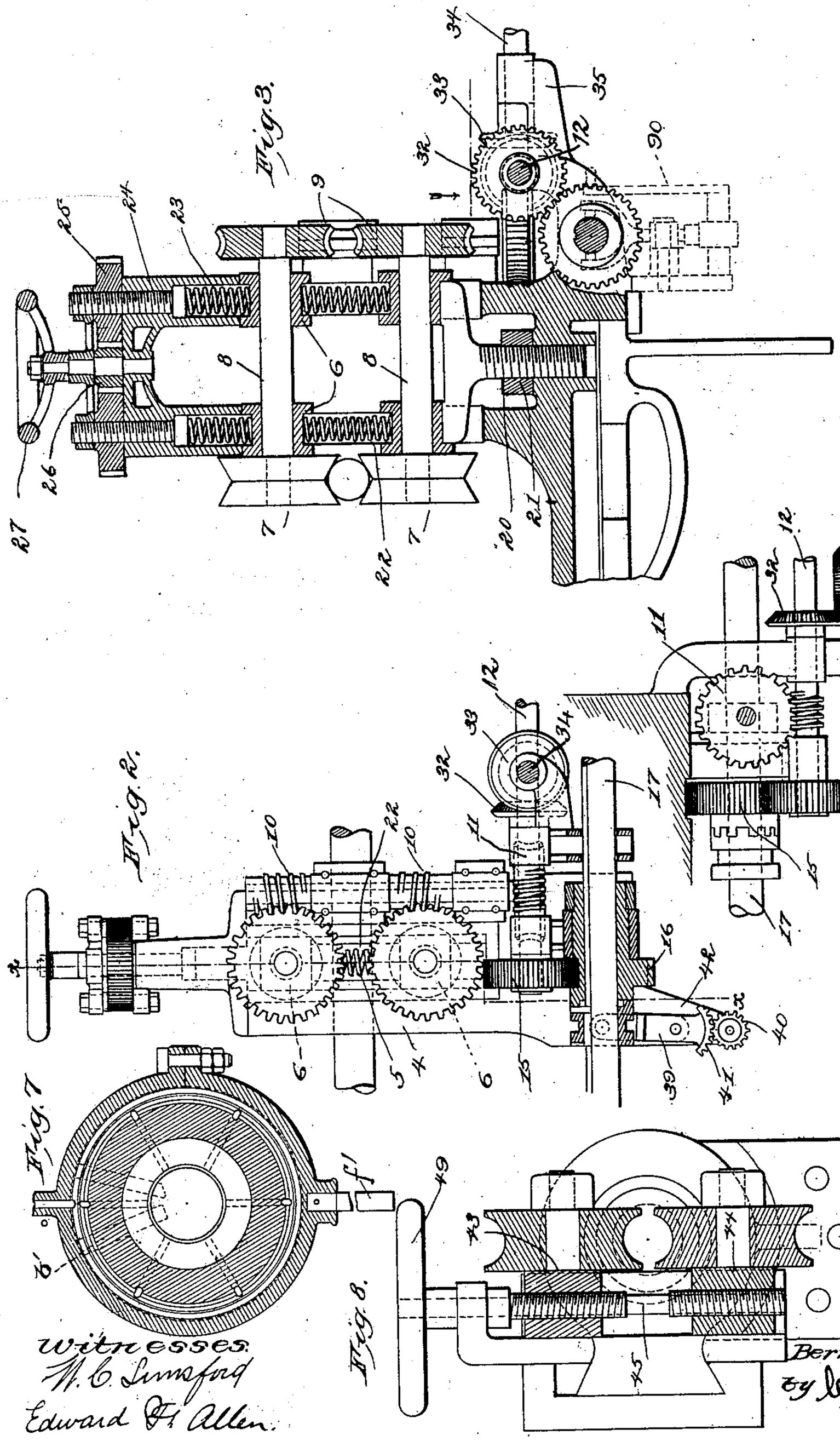
B. DREYER.

MACHINE FOR TURNING SHAFTING.

(Application filed May 3, 1900.)

(No Model.) 2 Sheets—Sheet 2.



UNITED STATES PATENT OFFICE.

BERNHARD DREYER, OF SINDELFINGEN, GERMANY, ASSIGNOR OF ONE-HALF TO EMIL KABISCH, OF SAME PLACE.

MACHINE FOR TURNING SHAFTING.

SPECIFICATION forming part of Letters Patent No. 672,872, dated April 23, 1901.

Application filed May 3, 1900. Serial No. 15,330. (No model.)

To all whom it may concern:

Be it known that I, BERNHARD DREYER, a subject of the Emperor of Germany, residing at Sindelfingen, Böblingen, Kingdom of Würtemberg, Germany, have invented an Improvement in Machines for Turning Shafting, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to machines such as are adapted to turn a round bar or shaft; and the object of the invention is to provide means whereby the material is fed forward to a rotary cutter-head, the cutter-head carrying suitable tools which operate to turn the shaft or bar to the required diameter.

In the drawings, Figure 1 is an elevation of my improved machine. Fig. 2 is a detail showing a portion of the feeding mechanism. Fig. 3 is a vertical section on the line $x\,x$, Fig. 2. Fig. 4 is a view, partly in section, showing the means for supporting the turned shaft as it emerges from the cutter-head. Fig. 5 is an end elevation of the device shown in Fig. 4. Fig. 6 is a partial sectional view of the cutter-head, showing the manner of keeping the shaft and tools cool. Fig. 7 is a section through the cutter-head on the line $y\,y$, Fig. 6. Fig. 8 is a vertical section on the line $x\,x$, Fig. 1; and Fig. 9 is a detail showing the hand-operated means for operating the feed-rollers and looking in direction of arrow in Fig. 3.

Looking at Fig. 1, the bed or frame of the machine is designated by A, and this supports at its head end the rotary cutter-head 2, which is driven by the pulley 3 from any suitable drive-shaft, the said cutter-head carrying suitable tools for turning the shaft to the proper diameter, as will be hereinafter described.

Supported on the bed or frame in front of the cutter-head is a feeding mechanism for feeding the material to be turned to the cutter-head, the said material in this instance having only a longitudinal movement and the turning down of the shaft to the proper size being done by the rotary movement of the cutter-head.

I have shown herein a plurality of feeding devices operating in unison; but as they are both alike a description of one will suffice. The said feeding device comprises a plurality of suitable standards 4, carried in any suitable way on the bed of the frame A, the said standards each being slotted, as at 5, for the reception of bearing-blocks 6, which support the shafts 8, said shafts carrying at one end the feed-rolls 7 and there being two such shafts and feed-rolls in each standard. On the opposite end of each shaft 8 from the feed-roll is mounted a worm-gear 9, the worm-gears on each standard meshing with and being driven by a vertically-arranged worm-shaft 10, supported in any suitable bearings on the said standard 4, each shaft 10 carrying at its lower end a worm-wheel 11, which in turn meshes with and is driven by a worm on the longitudinally-arranged shaft 12, the said shaft 12 being driven by mechanism hereinafter described. As shown in the drawings, the shaft 12 is of sufficient length to drive the feed-rolls of both of the standards 4, the said shaft finding its support in suitable bearings 14 on the bed of the frame. The shaft 12 carries at one end a gear 15, which meshes with gear 16, rotative with a shaft 17, said shaft being driven from the driving-pulley 3, through the gears 18 and 19.

In order to adapt the feeding mechanism for feeding different-sized work to the cutter-head, I have made the feed-rolls 7 adjustable toward and from each other, the said adjustment being permitted by the bearings 6, which are capable of vertical movement in the slot 5 in the standard 4, as hereinafter described. The lower bearings 6 are positively adjusted by means of the bolt 20, (see Fig. 3,) the shank of which is screw-threaded and screws into a nut 21, carried by the standard 4. By turning the nut one way or the other the head of the bolt 20 can be raised or lowered, thereby raising or lowering the lower bearing 6, carrying the lower feed-roll 7. The bearings for the upper feed-roll are supported upon springs 22, said springs resting at their lower end upon the lower bearing 6 and supporting the upper bearings. To yieldingly hold the two feed-rolls against the work, I have provided the springs 23, which rest upon the upper side of the upper bearing 6, and are controlled as to the amount of tension by the bolts 24, which are sustained in the upper end of the standard 4 and are screw-threaded

through nuts 25. The said nuts 25 are held against longitudinal movement in any suitable way and are provided on their peripheries with gear-teeth, which mesh with gear 26, and by turning the gear 26 by means of the hand-wheel 27 the nuts 25 can be turned to vary the amount of compression in the springs 23. The outer end of the shaft to be turned may be supported on any suitable supports 30, said supports being sustained on the bed of the machine and carrying at their upper ends friction-rolls.

In beginning the turning of any shaft it is necessary to determine whether the tools are set to turn the shaft to the right diameter, and in order to withdraw the shaft from the cutter-head after the turning operation has begun, so that the same can be calipered and its diameter determined, I have provided mechanism for reversing the direction of rotation of the feed-rolls 7, whereby after the shaft has been turned a short distance the shaft may be withdrawn and its size determined. The shaft 12 has fast thereon intermediate its length a bevel-gear 32, which meshes with a bevel-gear 33, fast on the shaft 34, said shaft being carried by the arm 35 and having at its end any suitable hand-wheel. The gear 16 can be disengaged from the shaft 17 by means of the clutch device 37, which consists of the clutch member 38, splined to the shaft 17, so as to rotate therewith, but have longitudinal movement thereon. A forked lever 39 engages said clutch member 38, the said lever being pivoted on an arm 42 and being operated by any suitable means—such, for instance, as by the gear 40, meshing with the segmental rack 41 on the end of lever 39, the said pinion being turned by a handle 90. By disconnecting the clutch 37 and by turning the hand-wheel on the shaft 34 it will be obvious that the feed-rolls 7 can be turned in either direction by hand, and the shaft to be turned can thereby be withdrawn from the cutter-head, and the tools can be properly adjusted to turn the shaft to the correct diameter. When the tools have been properly set so as to turn the shaft to the proper diameter, the clutch 37 is thrown into operation when the feeding of the shaft to the cutter-head will be accomplished automatically by the mechanism above described.

By arranging a plurality of feeding devices in alinement I provide means whereby the shaft to be turned is positively held in the correct longitudinal position to be operated upon by the cutter-head, and by mounting the upper feed-roll yieldingly the shaft to be turned is automatically centered vertically during the turning operation.

My device is designed to turn each shaft throughout its full length, and therefore when the shaft has been advanced to the point where the unturned portion is about to leave the feeding device nearest the cutter-head it is necessary to provide some mechanism for positively holding the shaft in the correct longitudinal alinement, and this I accomplish by providing my device at the rear of the cutter-head with a suitable clamp, which comprises two clamping-jaws 43 44, which are shaped to engage the turned shaft, as illustrated in Fig. 8, the said clamping-jaws being adjustable to and from each other by means of a shaft 45, having right and left screw-threaded portions which engage lugs on the clamping member, the said shaft being operated by a hand-wheel 49. The clamp is adjustably mounted in any suitable way on a guide 50, which extends from the frame of the machine. As illustrated in Fig. 8, each jaw 43 44 is grooved on its outside edge, so that when one side of said jaw becomes worn the jaw may be turned over and used again.

In using my device one shaft is inserted into the feed-rolls 7 and fed forward to the cutter-head, and as this shaft passes through and leaves the feed-rolls a second shaft is inserted with its end abutting the end of the first-named shaft, and the two are simultaneously fed along, the second shaft operating to push the first shaft through the cutter-head, and the clamping-jaws 43 44 serving to hold the first shaft from rotation as its end is turned to the proper diameter.

In Fig. 1, at C, I have illustrated the end of one shaft abutting against the forward end of the second shaft. At the rear of the machine is a suitable support to receive the finished shaft after it has passed through the cutter-head, said support comprising the V-shaped member 51, carrying the rolls 52. The said V-shaped member or guide 51 is vertically adjustable by means of the screw-threaded supports $54^{\times}$, which are screw-threaded into the nuts $55^{\times}$, supported on the uprights 62. Each nut $55^{\times}$ has gear-teeth on its periphery, and a shaft 57, extending the length of the support, has a suitable worm-gear thereon, which meshes with the teeth of the nuts $55^{\times}$, the shaft 57 carrying at one end the hand-wheel 58, by means of which the said shaft can be turned and the V-shaped guide correspondingly raised or lowered. In order to discharge the finished shaft from the guide 51, I pivotally mount said guide on the supports $54^{\times}$, whereby said guide may be turned about its apex to thereby allow the shaft to roll from the guide onto skids or other suitable inclined surface and thence be carried to its storing-place. The guide 51 has suitable ears 59, which are fast on the pivot-shaft 61, the said shaft being supported for turning movement in eyes in the upper end of the screw-threaded supports $54^{\times}$. The said shaft has fast thereon the segment 67, carrying on its periphery teeth which mesh with worm on the shaft 68, which shaft may be operated by the hand-wheel 70. By turning the shaft 68 it will be evident that the support 51 can be turned about its pivot 61 and the shaft discharged therefrom.

As illustrated in this application, my in-

vention comprises a machine having a single rotary cutter-head carrying tools which are adapted to rough-turn and finish or polish the shaft at one operation, so that all of the turning or work upon the shaft is done at a single point, and for this purpose the cutter-head carries a series of suitable tools b' to operate on the shaft being turned, the said tools being supported in the cutter-head in any suitable way and being arranged obliquely to the shaft being turned, and in order to perform the operations above described I preferably employ a series of such tools, which are spaced at approximately equal distances apart, so as to bear against the shaft upon all sides thereof, thus preventing the shaft from springing or yielding during the turning operation. In order to keep the tools and the shaft cool during the turning operation, I provide mechanism whereby several streams of water are constantly thrown on the tools and shaft. On the sleeve of the cutter-head a ring c is fixed, in the periphery of which is a groove d, from which groove extend channels e through the cutter-head, the said channels emerging at the point where the tool operates upon the work. The ring c has at each side beveled flanges c', and surrounding said ring and fitting between the bevel-flanges is a second ring f, which is held against rotary movement by means of the arm f', integral therewith and depending therefrom, said arm engaging at its lower end suitable lugs or stops on the bed of the machine. The inside of the ring f has a channel h, which when the ring is in place coincides with the channel d in the ring c, and said ring f has a duct g, which communicates with any suitable source of water-supply and through which the water is fed to the channel h. From this construction it will be readily seen that as the cutter-head rotates the ring c rotates inside of the ring f, and the water which is supplied through the duct g finds its way into the channel h and from thence into the channels e, which conduct the water to the tools and shaft, the water being thrown on the shaft in several jets. The bore of the cutter-head is slightly enlarged at the point where the channels e lead into the same, and in said enlarged bore is a ring i, the said ring being perforated and being adjustable lengthwise of the cutter-head, the ring serving to prevent the chips from entering the channels e.

The invention is not limited in all of its details to the precise construction herein set forth, but may be varied in many details within the scope of the appended claims.

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

1. In a machine for turning metal shafting, a single rotary cutter-head carrying a plurality of tools and having a central bore through which the work is adapted to pass, mechanism to feed the work to said cutter-head, said mechanism comprising a plurality of pairs of vertically-adjustable feed-rolls rotating on a horizontal axis and adapted to hold a shaft between them, one of said rolls being yieldingly held against vertical movement in either direction, means to regulate the tension upon said yieldingly-held roll, and means to rotate all of said rolls in unison.

2. In a machine for turning metal shafting, a single rotary cutter-head carrying a plurality of tools, means to feed the shaft to said cutter-head, said means comprising a plurality of pairs of feed-rolls adapted to have the work clamped therebetween, said pairs of feed-rolls being arranged in longitudinal alinement, means to adjust the said rolls vertically, one of the rolls of each pair being yieldingly supported, a drive-shaft, means connecting said drive-shaft with the feed-rolls to rotate all the rolls in unison, said means including a clutch whereby the rolls can be disengaged from the drive-shaft and operated independently thereof.

3. In a machine for turning metal shafting, a single rotary cutter-head carrying a plurality of tools, means to feed the shaft to said cutter-head, said means comprising a plurality of standards, each standard carrying a pair of parallel horizontal shafts, feed-rolls on one end of each of said shafts outside of the standards, and worm-gears on the other end of said shafts, a vertical shaft carried by each standard, said vertical shaft having a worm meshing with each worm-wheel, gears at the lower end of said vertical shafts, a drive-shaft to operate said gears in unison, and connections whereby the drive-shaft may be operated either by power or by hand.

4. In a machine for turning shafting, a single rotary cutter-head having a central bore through which the shaft is fed, feeding mechanism to advance the work, and a support for the finished shaft in line with the cutter-head said support comprising a V-shaped guide to receive the shaft as it emerges from the cutter-head, a standard on which said guide is pivoted, and gearing to positively turn said guide about its pivot to any desired extent to discharge the finished shaft therefrom.

5. In a machine for turning shafting, a rotary cutter-head having a central bore through which the work is fed, feeding mechanism to advance the work, and a support for the finished shaft in line with said cutter-head, said support comprising a V-shaped guide to receive the shaft, a standard on which said guide is vertically adjustable, said guide being pivotally mounted on the standard, and means operative in any adjusted position of the guide on the standard to turn the guide about its pivot to discharge the finished work, said means comprising a worm-gear fast on the guide, and a worm coöperating therewith.

6. In a machine for turning shafting, a hollow rotary cutter-head, a stationary ring in which said cutter-head rotates, said ring having a groove on its inner periphery, and a duct leading to said groove, a coöperating

groove on the exterior of the cutter-head, and a plurality of channels leading from said last-named groove to the interior bore of said cutter-head, whereby water may be conducted to the shaft to cool the same.

7. In a machine for turning shafting, a hollow rotary cutter-head, a stationary ring in which said cutter-head rotates, said ring having a groove on its inner periphery, and a duct leading to said groove, a coöperating groove on the exterior of the cutter-head, and a plurality of channels leading from said last-named groove to the interior bore of the said cutter-head, and a perforated ring on the interior of the bore and covering the outlet of the channels whereby water may be conducted to the shaft to cool the same, and chips prevented from passing into the channels.

8. In a machine of the class described, a single rotary cutter-head having a plurality of tools, means to feed a shaft to said cutter-head said means comprising a plurality of standards, each standard having a pair of feed-rolls rotating about a horizontal axis, worm-gears operatively connected to said feed-rolls, and a vertical shaft having worms coöperating with said worm-gears, a single shaft geared with said vertical shafts, and means to rotate the same.

9. In a machine of the class described, a single rotary cutter-head having a plurality of tools, a feeding mechanism to feed a shaft to said cutter-head, said feeding mechanism including a plurality of standards, each standard having a pair of feed-rolls mounted thereon, a shaft common to all said feed-rolls and adapted to operate the same in unison, a drive-shaft clutch mechanism to drive the first-named shaft from the drive-shaft, the construction being such that when the clutch is disengaged the first-named shaft may be operated by hand.

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

BERNHARD DREYER.

Witnesses:
MATTHÄUS SCHNEIDBERGG,
P. HOLZ.