

A. J. SCHULTE.
CHUCK MECHANISM FOR SPINDLE TURNING MACHINES.
APPLICATION FILED MAR. 14, 1912.

1,061,411.

Patented May 13, 1913.

4 SHEETS—SHEET 1.

FIG. 1

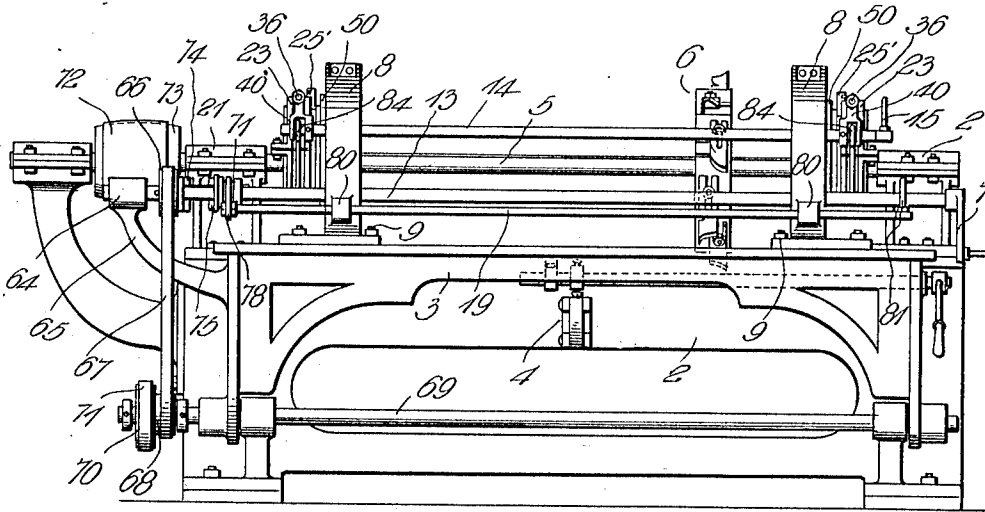
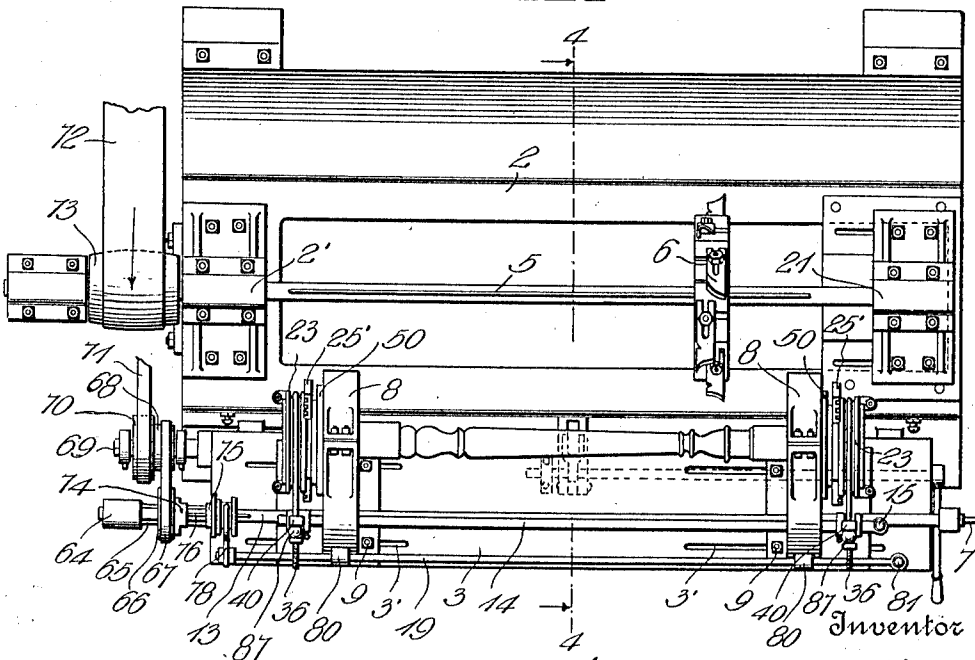


FIG. 2



Witnesses

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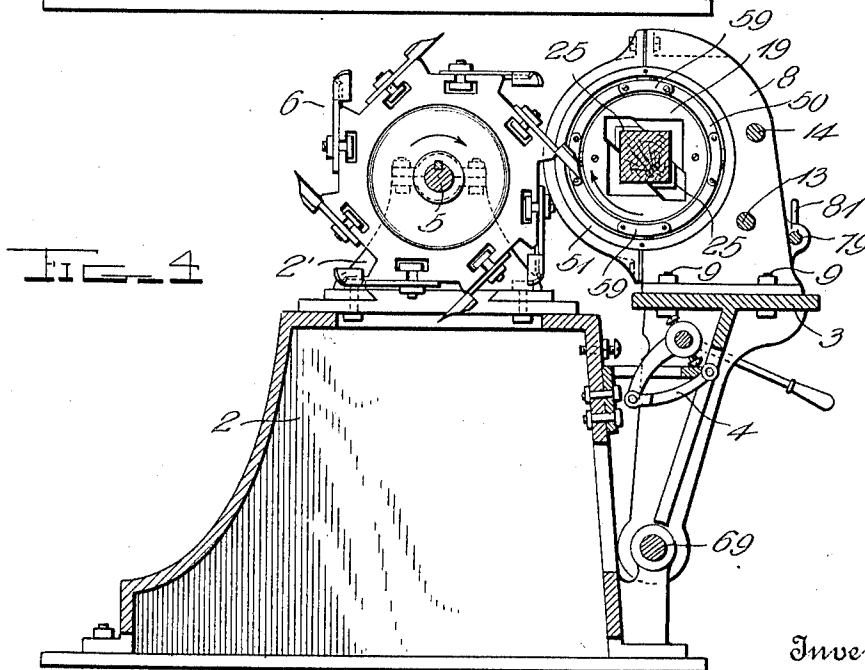
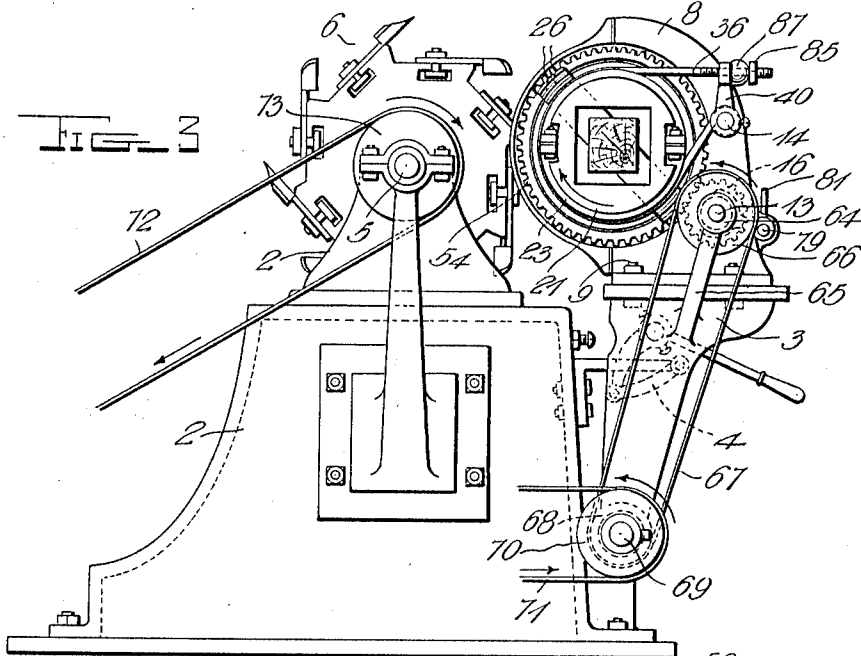
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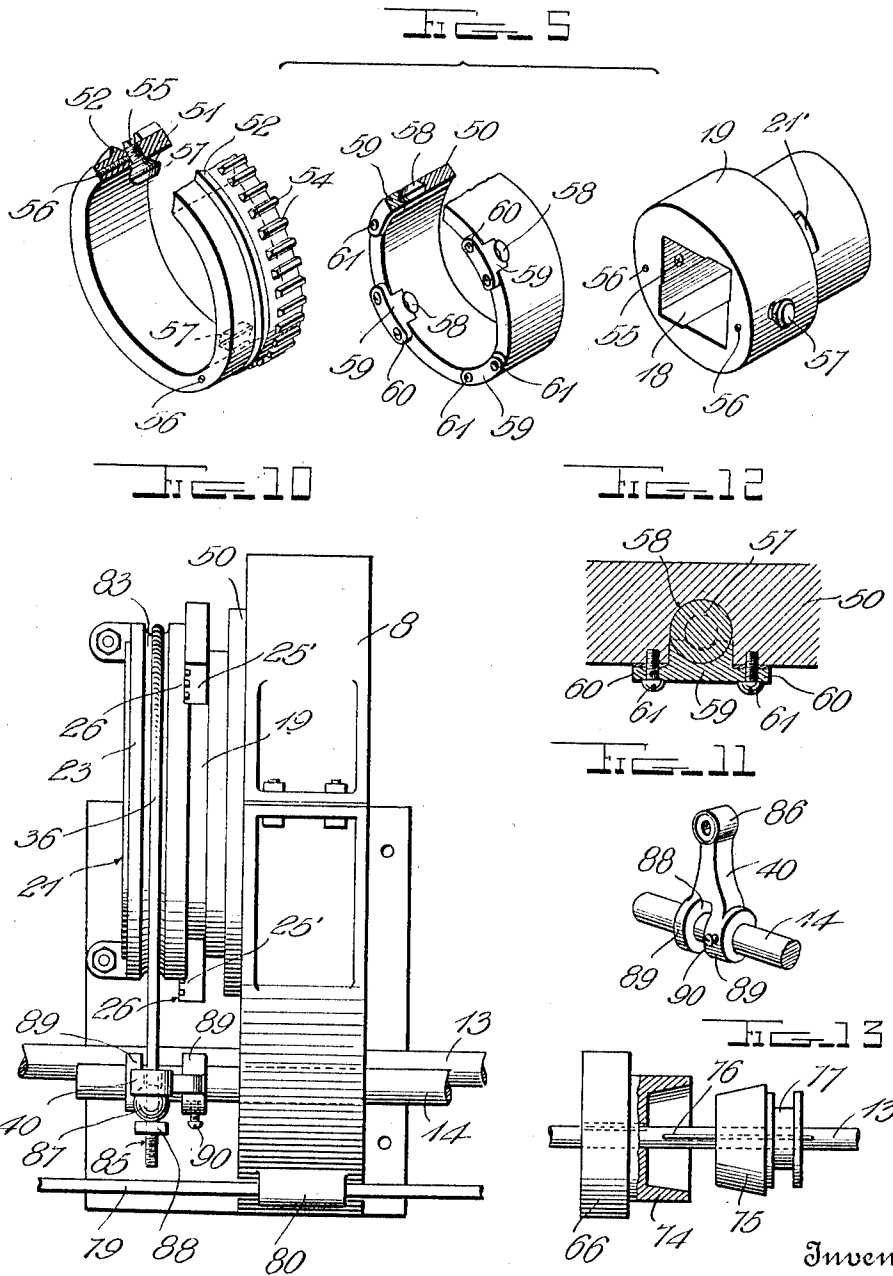
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4 SHEETS—SHEET 3.



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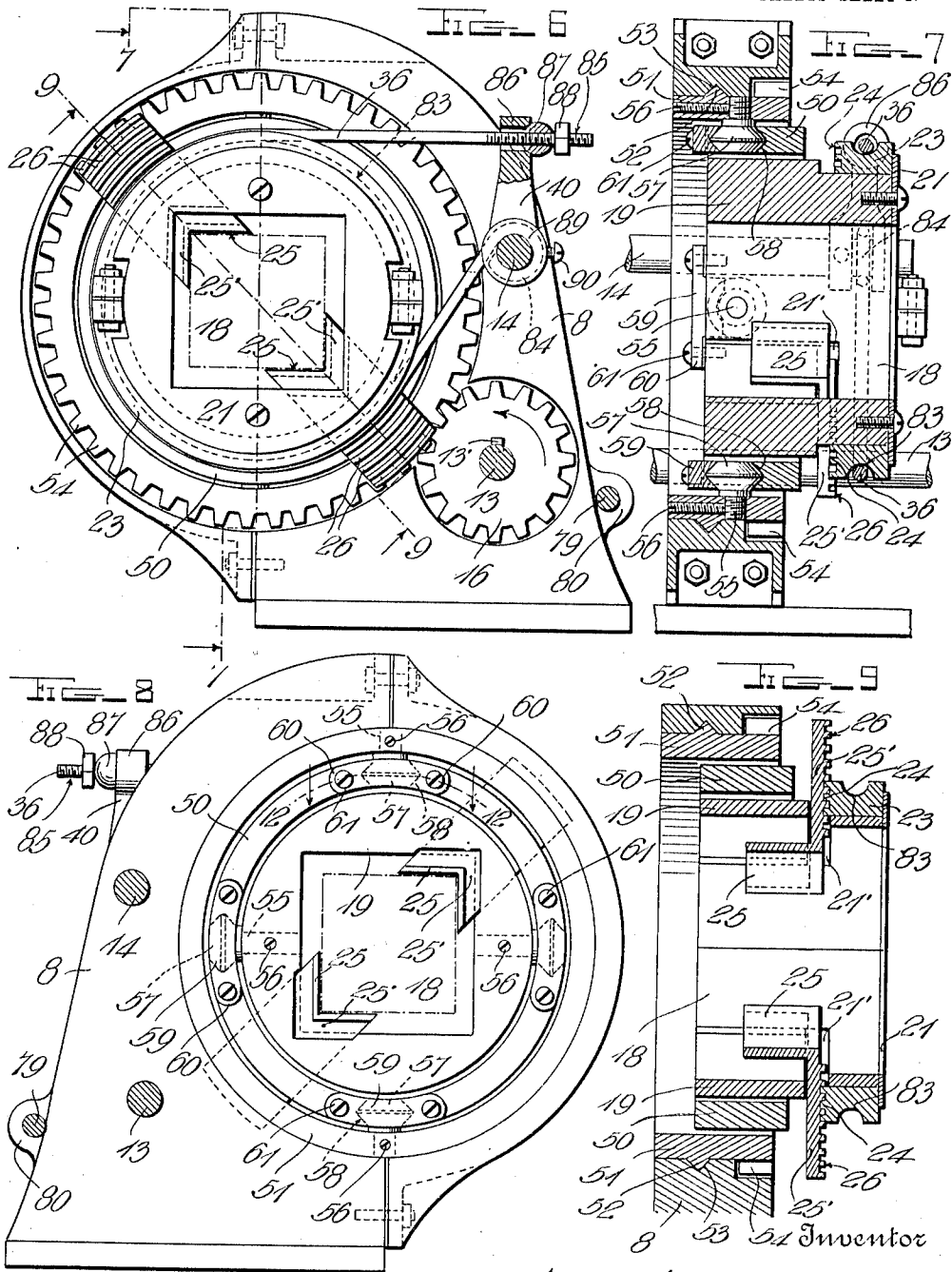
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UNITED STATES PATENT OFFICE.

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CHUCK MECHANISM FOR SPINDLE-TURNING MACHINES.

1,061,411.

Specification of Letters Patent.

Patented May 13, 1913.

Application filed March 14, 1912. Serial No. 683,832.

To all whom it may concern:

Be it known that I, AUGUST J. SCHULTE, a citizen of the United States, residing at Tacoma, in the county of Pierce and State of Washington, have invented certain new and useful Improvements in Chuck Mechanism for Spindle-Turning Machines; and I do 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.

This invention relates to wood-turning lathes, and more especially to the work-holders thereof; and the object of the same is to effect improvements in U. S. Patent Number 787,133, granted April 11, 1905, to Axel Thorsby, by mounting the body of the chuck within the chuck stock by means of an improved form of universal joint so that a column or spindle which is not exactly straight may be clamped by the chuck without injury to either. This object is accomplished by the construction hereinafter more fully described in connection with or as applied to a machine which includes many of the characteristics of that in the patent above referred to, and shown in the drawings forming a part of this specification wherein—

Figure 1 is a front elevation and Fig. 2 a plan view of the complete machine. Fig. 3 is an end elevation taken from the left hand in Fig. 1. Fig. 4 is a cross section on the line 4—4 of Fig. 2. Fig. 5 is a perspective detail of the parts of the universal joint slightly separated and partly broken away. Fig. 6 is an enlarged end elevation of one of the heads. Fig. 7 is a section on the line 7—7 thereof. Fig. 8 is a similar elevation of the head viewed from the opposite direction from that seen in Fig. 6, and Fig. 9 is a section on the line 9—9 of Fig. 6. Fig. 10 is a plan view, and Fig. 11 a perspective detail of the brake-band operating mechanism and a portion of the shaft on which it is mounted. Fig. 12 is a sectional detail on the line 12—12 of Fig. 8. Fig. 13 is an enlarged detail of the form of clutch which may be employed, as described hereinafter.

While this invention is capable of employment in connection with machines of various types, it is particularly adapted to and intended for lathes for turning all kinds of spindle balusters and columns; and as typical of one such machine, I have described my improvement in connection with the

patent to Thorsby above referred to and whose general features of construction may be briefly described as follows: The high base 2 has bearings 2' in which is journaled the rapidly revolving arbor 5 carrying the cutter head 6 with its cutters which move in the direction of the arrow. The work table forms part of a swinging carriage 3 having its lower end hingedly connected with the base so that the table may be moved forward and backward by any suitable operating mechanism 4, to press the stick or piece of "work" into contact with the cutters or remove it therefrom as usual. Near each end the table is slotted longitudinally as at 3' and bolts 9 adjustably engage said slots for securing upon the table the bracket-like stock 8 of the chuck and the mechanism connected therewith which constitutes the work holder. Within the stock is rotatably mounted the chuck body 19 having a square hole 18 through its axis for the work and two radial guides 21' for the shanks 25' which carry the clutch jaws 25. Said shanks are threaded as at 26 to engage a spiral bead 24 on a ring 23 rotatably mounted upon the chuck body behind a plate 21 which is removably held in place by screws 22, so that when the ring is turned relatively to the chuck body the jaws are moved outward or inward as well known, and the same result is achieved when the chuck body is turned and the ring is held stationary. For this latter purpose a retarding device is employed which is shown in Figs. 6 and 7 as consisting of a rod or band 36 having one end attached to a shaft 14 and the other to a lug 40 projecting radially from said shaft so that when the latter is turned the band is tightened upon the ring 23. Such shaft extends through both stocks 8 and has a handle 15 at its right end within reach of the operator who stands there. As in the Thorsby patent, the bodies of the chucks have teeth meshing with pinions 16 splined as at 13' on a shaft 13 extending through both stocks 8 and having a crank-handle 7 at its right end adjacent the position of the operator so that he may rotate or turn the chucks and hence the work by hand; and I make use of the same details of construction, with amplifications which will be set forth below.

No novelty is claimed for the details of construction of the machine hereinbefore described, and which may be distinguished

by the fact that the reference numerals applied thereto are less than 50. The operation of this machine will be included in the description of the operation of my improved machine yet to be given herein, and the advantages resulting from the improvements attached will then be apparent. A description of my improvement follows in detail.

The first feature of improvement forming the subject matter of the present invention consists in mounting the chuck body within its stock in such manner that it will have or may have not only a rotary movement but a tilting movement therein, while still maintaining its true axial position. It often happens that the stick or piece of work to be turned is slightly warped or bent within its length so that the extremities which are held within the chucks and are not acted upon by the cutters must pass through the chuck on lines slightly oblique to their true axes, and in such cases when the chuck-jaws are brought into contact with opposite corners of the work the latter is not gripped firmly or held by the entire width of the face of each jaw. Between the chucks the cutters quickly remove the surplus material on the protruding sides while they are removing the corners of a square piece of work, but throughout the entire operation of turning the work its extremities are imperfectly clamped between the chuck-jaws for the reason above stated. Or, if the ends of the pieces of work be but slightly bent the shanks of the chucks may bind in their guides when the jaws are forced into contact with such ends, and it will be difficult to detach and remove the finished piece of work. Or, if the spindle being turned is small, the jaws when brought forcibly into contact with it may straighten it out so that it can be turned successfully but resumes its warped or bent condition when it is removed from the machine. In order to avoid these contingencies I have provided means for mounting the body of the chuck within the stock so that it may wobble or tilt slightly, as best illustrated in Figs. 5 to 9 inclusive. The chuck body 19 is mounted loosely within a ring 50, and the latter in turn is mounted loosely within another ring or band 51, which is mounted closely but yet so that it may turn within the annular body of the stock 8. Any suitable guide may be provided between these two members, as for instance the rib 52 on the band 51 engaging the groove 53 within the stock 8 as shown in Fig. 9. Teeth 54 on the periphery of the band 51 engage the pinion 16 which is manually rotated by the crank 7 as described above. These three members, 19, 50 and 51 are connected in the form of universal joints by means of two pairs of pivots whereof the members of one pair stand diametrically opposite each other and connect the band with

the ring as seen in Fig. 7, and the members of the other pair stand diametrically opposite to each other and quartering to the members of the first pair and connect the ring with the body 19 as seen in dotted lines in Fig. 8. All of these pivots are by preference of similar construction, and a description of but one will therefore be necessary.

Each pivot comprises a threaded stud or shank 55 screwed into one member (the band 51 in Fig. 7) and preferably held in place by a set screw 56 bearing against its threaded shank, and a double-conical head 57 mounted in a correspondingly shaped socket 58 in the contiguous member, which socket opens at the edge of this member as seen in Fig. 12 and is closed by means of a plate 59 having ears 60 through which pass screws 61. By removing the latter and the plate, the socketed member can be separated from the other member, and by removing the set screw 56 the threaded shank 55 of the stud or pin can be disconnected from the member which carries it. However, I have illustrated and described this form of universal joint merely as typical, and reserve the right to employ any other form which may be used with equally good results. It is desirable, as pointed out above, that the chuck body 19 shall be mounted within the stock in such way that it may have a rotary movement therein, as will follow when the crank 7 is turned, and also that it may tilt therein if the extremity of the piece of work being clamped within the chuck is slightly bent; and this is one form of universal joint which would answer.

It sometimes occurs that it is desirable to clamp the work in the chuck by mechanical means, or to turn the work mechanically either slowly or rapidly, intermittently or constantly, and I have made provision for meeting this demand in the following manner: The chuck-turning shaft 13 is continued at its left end beyond the base 2 and mounted in a bearing 64 which may be supported by a bracket 65, adjacent which it is provided with a pulley 66 mounted loosely on the shaft and connected by a belt 67 with another pulley 68 which is mounted on the rod 69 forming the pintle of the hinge that supports the swinging carriage 3. This pulley 68 is driven from any suitable source of power, but independently of the means for driving the cutter-head arbor 5 which usually rotates at a high rate of speed. In the present instance, I have shown a second pulley 70 mounted on the same pintle 69 and fast to the first pulley 68, and a belt 71 driving said second pulley; whereas an independent belt 72 drives a pulley 73 fast on the arbor 5. However, any equivalent may be adopted without departing from the spirit of my invention, and it is quite possible that means may be present for varying the direction of

rotation of the two pulleys 73 and 70 and their speed, and the control-levers for such means will stand within reach of the operator above referred to. The hub of the pulley 66 carries a clutch element 74, adapted to be engaged by a second clutch element 75 which is splined on the shaft 13 as seen at 76 and has an annular groove 77, and said groove is engaged by a fork 78 at the left end of a rod 79 which slides through eyes 80 in the two stocks 8 and leads to the right end of the entire machine where it has a handle 81 within reach of the operator who stands there. This handle and rod and fork are for the purpose of shifting the clutch member 75 so that the shaft 13 may be connected with the power-driven pulley 66 and turned mechanically instead of manually by means of the handle 7, for a purpose to be explained more fully below.

The length of the piece of work being turned will regulate the distance apart at which the two stocks 8 must be set by means of the slot 3' and bolts 9 described above, and in so adjusting the stock the eyes 80 will slide along the rod 79 and the shafts 13 and 14 will be projected through the stock, the pinions 16 moving along the spline 13' on the shaft 13 as will be understood. But in order that the retarding device or brake may be adjusted along with the stock adjacent to which it is situated, I make use of a special construction which will now be described in detail, reference being had to Figs. 10 and 11. The periphery of the ring 23 is preferably grooved as seen at 83 in Figs. 9 and 7, and the brake band 36 is by preference made in the form of a rod or wire which will not become dislodged from said groove during the gyration of the chuck 19 and the ring 23 which of course moves with it. One end of the rod 36 is hooked over the shaft 14 as shown at 84 and may, of course, slide thereon during its longitudinal adjustment, its body passes thence around the ring 23 as shown in Fig. 6, and its other end is threaded as at 85 and passes through an eye 86 in the outer end of a lug 40 of special construction as best seen in Fig. 11; and the particular means I preferably employ for adjusting the tension of this brake band or rod is a globular nut 87 screwed onto the threads 85 next outside the eye 86 and a jam nut 88 screwed onto said threads outside the globe so as to hold the latter after it has been adjusted. The obvious function of the globular nut 87 is to permit the band to have a slight rocking connection with the eye 86 which it fits rather loosely as seen in Fig. 6. The lower end of the lug is preferably forked as indicated at 88, each form arm being formed at its extremity into a sleeve or eye 89 which slidably engages the shaft 14, and through one of said eyes is passed a set screw 90 to hold the fork in ad-

justed position on the shaft after it has been adjusted. In addition to the tilting to which the bend or loop of the brake band may be subjected, it is quite possible that the lug 40 may not be set strictly opposite the groove 83; and this construction prevents the hook 84 at one end of the rod or band 36 from becoming detached from the shaft while permitting a certain flexibility of the connection between the other end thereof and the outer end of the lug 40, and therefore allows the loop to closely embrace the ring 23 and retard its rotation when desired, whether it gyrates or not.

The operation of this entire machine is as follows: The proper cutters 6 are applied to the cutter-heads, and the arbor 5 rotated rapidly in the direction of the arrow by power applied to the belt 72. The handle 15 is moved to rock the shaft 14 so as to apply the brakes to the two rings 23, after which the shaft 13 is rotated to the left by means of the crank handle 7 as will be described below, with the result that the bands 51 are turned within the stocks 8 and—through the universal joints above described—the chuck heads 19 are also turned and the teeth 26 on the chuck-shanks 25' which are in engagement with the spiral threads 24 on the rings 23 cause the chuck jaws 25 to move away from each other. A square stick or piece of work is then inserted through one of the square holes 18 and passed through both chuck-bodies 19 as seen in Fig. 3, after which—still holding the retarding mechanism in contact with the rings 23—the operator turns the shaft 13 in the opposite direction either by the crank handle 7 or mechanically as will be described below, with the result that the chuck jaws 25 are moved toward each other and caused to engage diametrically opposite corners of the square piece of work as seen in Fig. 6. If one end of the stick should be a trifle larger than the other or if the jaws come into engagement with it earlier than they do in the other stock, the only result will be that the band 36 will slip within the groove 83. If either or both ends of the stick are bent out of a straight line, the chuck-body will be canted within its band 51 as the universal joint will permit, and no injury will result to the work or the chuck. The carriage swinging mechanism 4 is then manipulated to feed the carriage and work forward from the position shown in Fig. 3 to and beyond that shown in Fig. 4 until the projecting corners of the square piece of work are struck by the cutters and first "roughed" or rounded, whether the stick be absolutely straight or not; and then shaped. As the finished product is formed the carriage and work are pressed farther and farther forward in a manner well known in the art of turning. Meanwhile

the work will be turned steadily or intermittently in the direction of the arrows in Figs. 3 and 4 so that all corners of the stick will be presented one after another to the cutters, and this turning may be effected manually by means of the crank handle 7 or mechanically in a manner to be set forth below. When the spindle or column has been finished, the carriage and work table are swung back to their original position shown in Fig. 3, and the jaws 25 are caused to recede by a repetition of the operation first described above, and the finished product is knocked out of place and a new stick inserted. When it becomes necessary to adjust the relative position of the stocks 8 for a longer or shorter piece of work, one or both of the set screws 90 are loosened so that the eyes 89 may be moved along the shaft 14 as the stocks are adjusted along the slots 3', and finally the set screws 90 are tightened up again in a manner which will be clear. As a warped piece of work is put into place, or as it rotates after it has been put in place, the chuck-bodies 19 tilt within their bands 51 as the latter turn within the stocks 8 in a manner well described above, in order that the advantages pointed out may be attained. But the other feature of my invention—while apparently nothing more than the application of power, when desired, for the purpose of driving the shaft 7—produces several possibilities and advantages in this machine not otherwise possessed by it. When the brakes are set, it is obvious that the chuck-jaws 25 will be forced into firmer contact with the stick to be turned, than if the shaft 13 were rotated by hand. Ordinarily, also, the clamping action will take place quicker when the shaft is mechanically driven than when it is turned manually. As the belt 71 ordinarily moves in the direction of the arrow adjacent it, power will be used to clamp the chucks upon the work, and the latter will be released from them by hand. But it sometimes occurs that the nature of the work being turned out makes it advisable that the

work itself be rotated steadily, continuously, and more or less rapidly; and obviously this can be accomplished by power better than by hand. Also when the work to be turned out is a polygonal column whose faces are scalloped or dished, it is well known that one face of the work will be fed up to the cutters, the carriage then retracted and the work turned intermittently, the next face so treated, and the operation repeated; and this can obviously be better done by power than by hand. Finally, in cases where the work is long and heavy it may not be possible to turn it so easily by hand as by power, and the latter is ever ready for application and use.

What is claimed as new is:

1. A lathe stock, a band rotatably mounted within the stock, means for turning the band at will, and diametrically opposite pins projecting inward within the band; combined with a chuck head, diametrically opposite pins projecting outward therefrom, jaws adjustable within the head, and a ring interposed between the band and head and having sockets set quartering to each other for loosely engaging the four pins.

2. A lathe stock, a band rotatably mounted within the stock, means for turning it at will, and diametrically opposite pins projecting radially inward within said band and having heads at their inner extremities, combined with a chuck head, diametrically opposite pins projecting radially outward therefrom and having heads at their outer extremities, and a ring interposed between said band and head and having sockets set quartering to each other for loosely engaging the heads of said four pins.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

AUGUST J. SCHULTE.

Witnesses:

ADOLPH H. FISCHER,
CHARLES ARNT.