No. 627,529.

Patented June 27, 1899.

G. E. RANDLES.

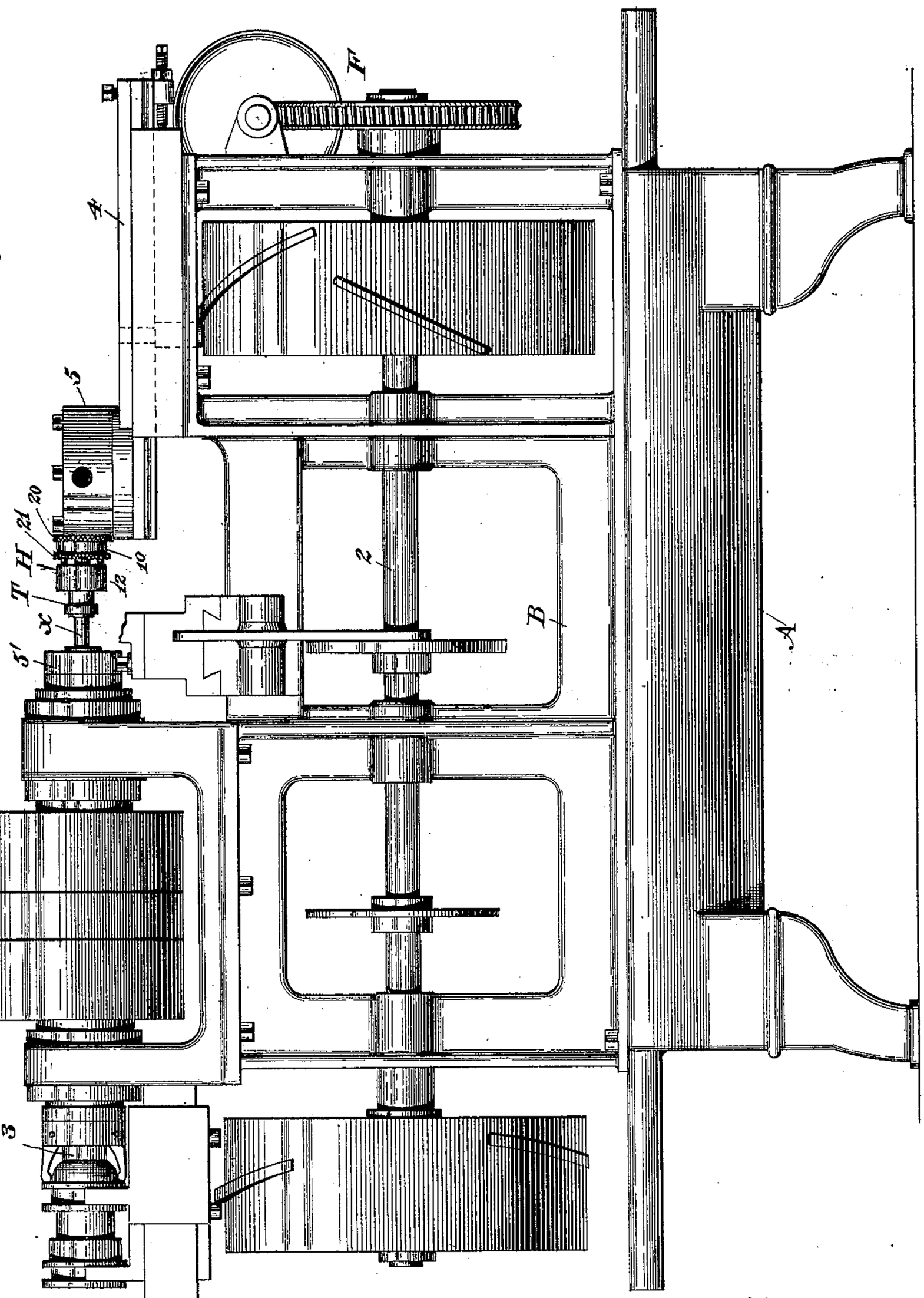
SCREW MACHINE.

(Application filed Oct. 7, 1898.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

Fig. 2.

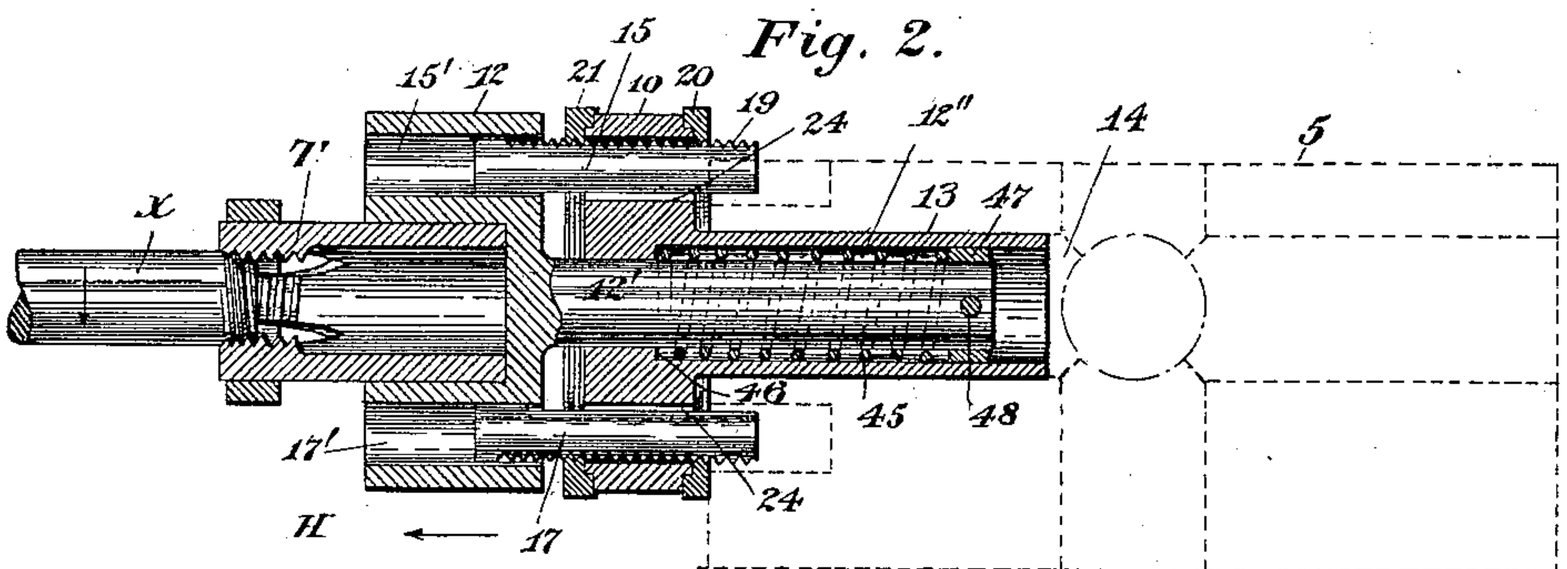


Fig. 3.

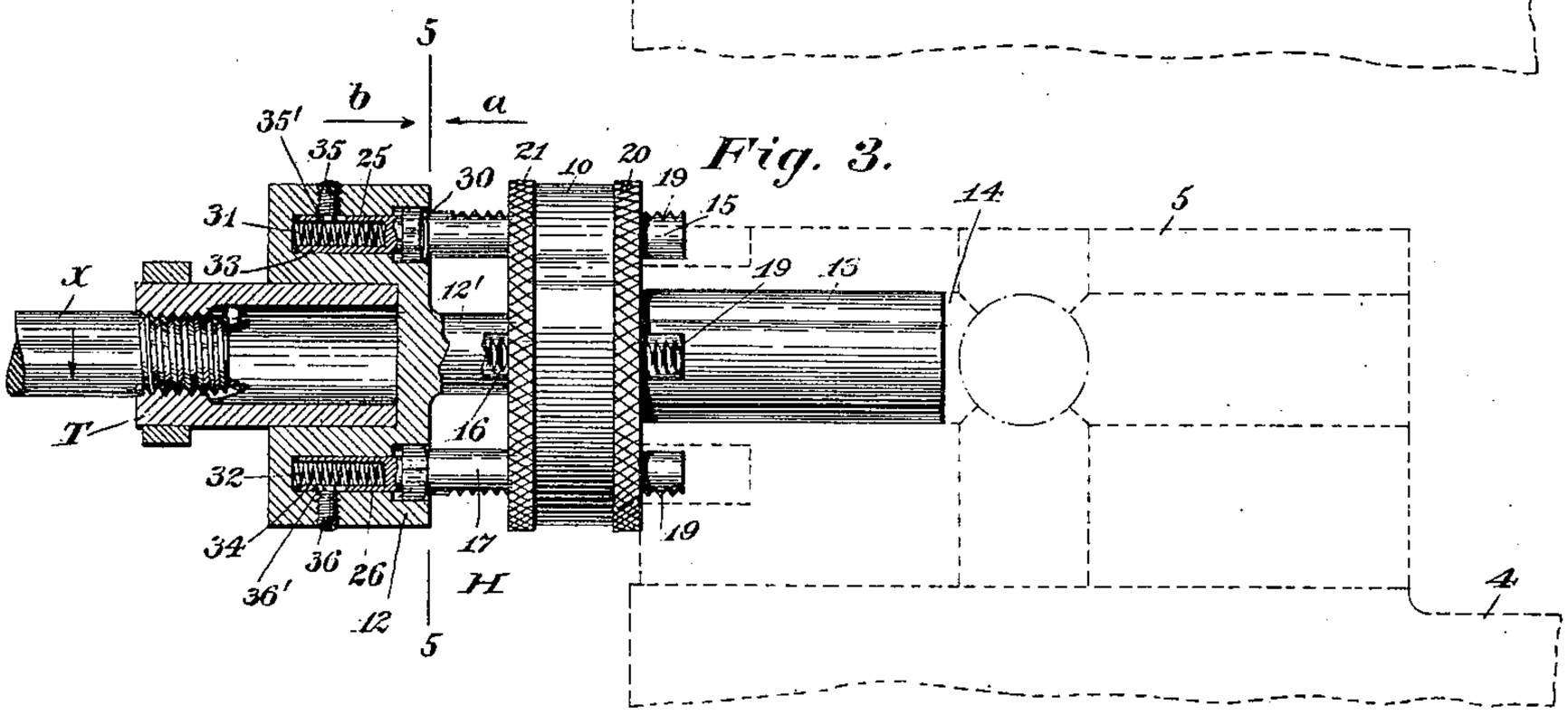


Fig. 4.

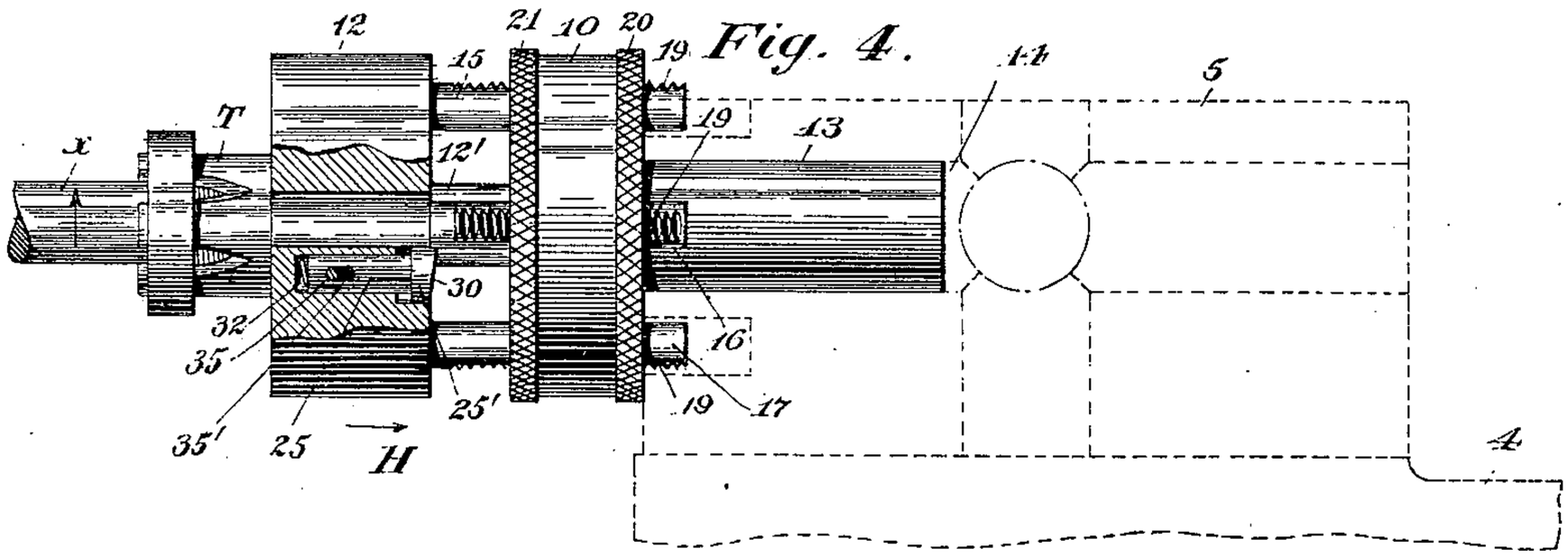


Fig. 5.

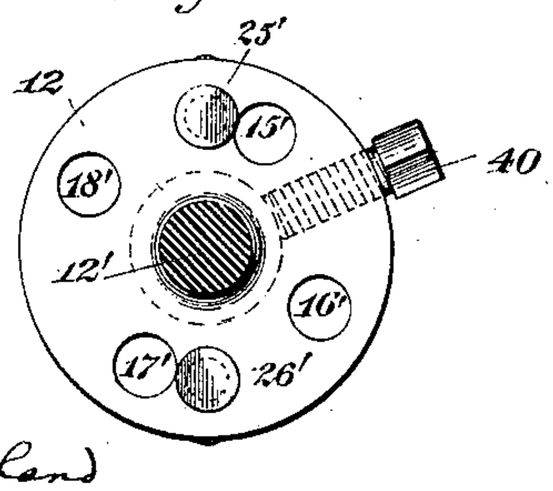
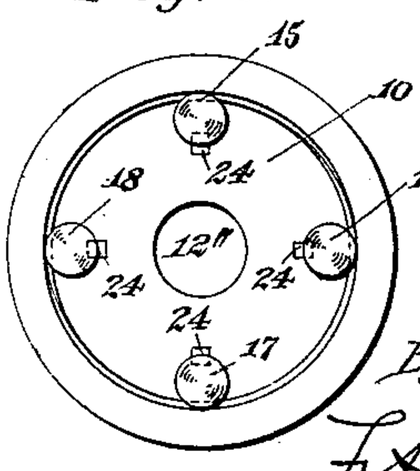


Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORGE E. RANDLES, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE PRATT & WHITNEY COMPANY, OF SAME PLACE.

SCREW-MACHINE.

SPECIFICATION forming part of Letters Patent No. 627,529, dated June 27, 1899.

Application filed October 7, 1898. Serial No. 692,927. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. RANDLES, a citizen of the United States, residing in Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Screw-Machines, of which the following is a specification.

This invention relates to screw-machines, and more especially to means for automatically regulating the length of a thread to be cut independently of the mechanism which drives or feeds the turret or other carrier for the threading-tool and to a device for holding said threading-tool.

My invention includes as one of its features work-holding means, a screw-threading or analogous tool, a carrier for said tool, means for feeding the carrier, a holder for said screw-threading tool, and means operable independently of the carrier-feeding means for regulating or determining the length of thread to be cut. The means for controlling the length of thread is preferably adjustable and is usually carried by the holder for the screw-threading or other tool, by reason of which the amount of thread to be cut can be readily and quickly varied without adjusting any parts of the feed or driving mechanism for said carrier, this last-mentioned operation ordinarily consuming considerable time and necessitating great care in this class of apparatus as now constructed.

My invention includes as another of its features a holder for a tool, such as a screw-threading die or tap, consisting of two sections, one of which is usually reciprocative and oppositely rotative relatively to the other, and a stop located to arrest the motion of said reciprocative and oppositely-rotative section at a predetermined point.

In screw-machines the work is usually fixed against longitudinal movement during the formation of a thread, and the holder which carries the die or tap is advanced either to form an external or internal thread, and the tool in my improved machine is held by the holder just specified, the two parts of which, for convenience in distinguishing them, being denoted, respectively, by the terms "fixed" and "movable" members. The movable member of the holder, which directly carries the threading-tool, usually has a perforation or recess adapted to receive a projection or pin carried by the fixed member, which slides in said recess, and in practice I prefer to employ a series of such recesses and a corresponding series of projections or pins.

In the drawings accompanying and forming part of this specification, Figure 1 is a side elevation of a screw-machine of known construction provided with my improvements. Figs. 2, 3, and 4 are sectional side elevations of the holder for the screw or other tool, on an enlarged scale, and show the movable member thereof in three of its positions during the formation of a thread, and said figures illustrate a turret by dotted lines. Fig. 5 is a cross-sectional view taken in line 5 5, Fig. 3, looking in the direction of the arrow *a;* and Fig. 6 is a similar view looking in the direction of the arrow *b*.

Similar characters designate like parts in all the figures of the drawings.

The framework for sustaining the several parts of the machine is illustrated as consisting of a main frame A and an auxiliary frame B, the latter directly supporting the driving-shafts, feed mechanism, &c.

In a general way the construction and operation of the machine illustrated are in many respects similar to those of automatic screw-machines now in use, and said machine embodies the usual cam-shaft 2, carrying a series of cam-drivers for operating the different tools and other parts of the machine, a work-spindle, as 3, a turret-slide, as 4, carrying a turret 5, which is equipped with the usual tools for operating upon the blank, and a chuck 5′ for holding the work *x* to be operated upon.

The mechanism for reciprocating the turret-slide 4, and consequently the turret 5, and for also rotating said turret to bring the successive tools thereof into position for operation upon the blank, is designated in a general way by F, and the mechanism for driving and for also reversing the rotation of the work-spindle 3 is designated by D and includes a series of pulleys 6, 7, and 8, the belts of which and the belt-shipping mechanism are not shown.

My invention includes as one of its features

a holder for a tool, said holder being clamped in the turret 5 and being designated by H and adapted to hold a tool, as T, which is represented in the present case as a die for cutting an external thread, although it is obvious that a tap or other metal-working tool could be secured in the holder.

The holder H usually embodies two disks 10 and 12, the two parts being denoted, respectively, for convenience as the "fixed" and the "movable" members of the device and the part 10 having a shank or stem 13, which fits into a socket 14 in the turret 5 and is held therein in the usual manner, and the part 12 having an elongated shank 12′, which slides in the bore 12″, formed centrally in the part 10 and extending through the stem 13 of said part 10. The section 12 of the tool-holder is mounted for reciprocative and oppositely-rotative movement relatively to its companion, and one of said members is provided with means for regulating automatically the amount of forward movement of the movable member, and thereby determining the length of thread to be cut.

The means illustrated for controlling the forward stroke of the movable holder-section 12 is illustrated consisting of a series of projections or pins, which may be of any number, (four being illustrated herein and designated, respectively, by 15, 16, 17, and 18.) Said pins are shown as carried by the fixed member 10 of the holder, although this disposition may be reversed without departing from the spirit of the invention, and said pins are adapted to enter a corresponding series of perforations or recesses, as 15′, 16′, 17′, and 18′, which are formed in the member 12, as represented in Fig. 2.

In Fig. 2 the die or tool T is represented as operating upon the work *x*, which is rotating in the direction of the arrow, and the outer ends of the several pins are shown as disposed in the coöperating recesses in the member 10, by reason of which the work or blank as it rotates will tend to rotate the said member 12; but the pins being rigid on the member 10, which it will be understood is fixed against rotative movement, the rotation of the member 12 is thereby prevented, and it naturally follows that the advance of said member 12 is caused by the thread being cut on the blank. The forward movement continues until the pins are clear of their recesses, as represented in Fig. 3, by reason of which the part 12 is free to rotate and the further advance of said part 12 cannot occur.

It will be understood from the foregoing description that the pins 15, 16, 17, and 18 control the operation of the tool, and for the purpose of cutting threads of different lengths without the necessity of manipulating the driving mechanism F, I prefer to make the pins adjustable, they being adapted to move longitudinally through a series of holes extending through the part 10, as indicated in Fig. 2. Each of the pins has a thread, as 19, adapted to be engaged by the corresponding thread of the internally-threaded collars 20 and 21, rotatively supported upon the fixed member 10. Said collars serve to move all of the pins simultaneously, one of them being adapted to move said pins forward and the other backward, while that collar which is not employed for feeding the pins is carried with them as they move and is then turned backward to serve as a check-nut firmly to hold said pins in their adjusted positions.

The threaded pins 15, 16, 17, and 18 are held against turning by a series of keys, as 24.

After the pins have passed out of the recesses the reversing mechanism starts and reversely rotates the chuck-spindle and the member 12, and in connection with the pins I prefer to provide a series of stops, as 25 and 26. While one of these stops will serve the purpose, I prefer to employ two, as I thereby secure a more stable structure. The stops 25 and 26 are yieldingly mounted and are disposed in suitably-formed diametrically opposite sockets in the member 12, and they project normally beyond the inner face of said member. On the advance or forward rotation of the member 12 the stops will strike the fixed pins when the latter are withdrawn from the recesses and will be forced into their seats by said pins, whereby said member may freely rotate; but on the reversal of the rotation of said member the heads of the stops will strike two of the pins, and thereby arrest further rotative movement of the member 12. This being the case, said member 12 will be forced toward the member 10 by the threaded work as it withdraws from the die, and the pins 15, 16, 17, and 18 will enter the recesses 15′, &c., as indicated in Fig. 4, until the parts 10 and 12 come into contact.

The stops 25 and 26 are preferably spring-actuated, and each of them consists of a pin longitudinally slidable in socket in the part 12, said pins having enlarged heads, as 25′ and 26′, extending normally beyond the inner face of the part 12 and each of them being beveled, as at 30. The two stops are held in their outer positions by coiled springs, as 31 and 32, disposed in the hollow shanks 33 and 34 of said stops and bearing against the part 12 and the stops, respectively, and are held against rotation and also in their seats by the screws 35 and 36, carried by the part 12, the inner ends of which are disposed in longitudinal slots, as 35′ and 36′, in the hollow shanks of the two stops. When the pins 15, 16, 17, and 18 are clear of the recesses 15′, 16′, 17′, and 18′ in the part 12, as represented in Fig. 3, the beveled ends 30 of the stops will impinge against the ends of said pins as the part 12 rotates, thereby forcing the stops into their seats and permitting such rotation until the reversing mechanism operates, when the projecting portions of the two stops will strike said pins, which instantly prevents further rotation of the part 12, and consequently causes the rearward feed of said part as the

work rotates in the direction of the arrow in Fig. 4.

The tool T is usually held in the part 12 by the set-screw 40, although other means can be utilized for this purpose.

Means are employed for holding the two sections of the holder H normally in contact, and said means is represented as consisting of the coiled spring 45, bearing against the shoulder 46 on the part 10 and also against the collar 47 on the end of the stem 12′, said collar being fixed in place by the pin 48. When the part 12 has advanced in the manner hereinbefore specified, the spring is compressed and relaxes on the opposite movement of said part 10; but its only purpose is to hold the two parts in contact except when a thread is being cut.

The invention is not limited to the particular features of construction hereinbefore described, as many changes may be adopted by persons conversant with this class of apparatus without departing from the scope thereof.

Having described my invention, I claim—

1. A tool-holder consisting of two members, one of which is reciprocative and rotative relatively to the other, one of said members having a pin and the other a stop independently mounted for yielding movement and adapted to be engaged by said pin.

2. A tool-holder consisting of two members, one of which is reciprocative and rotative relatively to the other, one of said members having a pin and the other a yielding stop beveled at its working end and adapted to be engaged by said pin.

3. A tool-holder consisting of two members, one of which is reciprocative and rotative relatively to the other, one of said members having an adjustable pin and the other a stop independently mounted for yielding movement and adapted to be engaged by said pin.

4. A tool-holder consisting of two members, one of which is reciprocative and rotative relatively to the other, one of said members having a threaded pin and also having a nut adapted to engage the thread on said pin whereby to adjust the same, and the other member having a stop adapted to be engaged by said pin.

5. The combination, with a tool-holder comprising two members, one of which is reciprocative and rotative relatively to the other, of a threaded pin carried by one of said members and adapted to fit in a recess or perforation of the other member; a nut for adjusting said pin; and a stop on the other member adapted to be engaged by said pin.

6. The combination, with a tool-holder comprising two members, one of which is reciprocative and rotative relatively to the other and is provided with a series of recesses or perforations, of a series of pins carried by one of said members and adapted to fit in said recesses or perforations; means for simultaneously adjusting said pins; and a series of stops on one of the members adapted to be engaged by said pins.

7. The combination, with a tool-holder comprising two members, one of which is reciprocative and rotative relatively to the other, of a pin carried by one of said members and adapted to fit in a recess or perforation of the other member; means for adjusting said pin; and a stop on the other member adapted to be engaged by said pin.

8. The combination, with a tool-holder comprising two members, one of which is reciprocative and rotative relatively to the other, of a threaded pin carried by one of said members; nuts for engaging the thread of said pin; and a stop carried by the other member and adapted to be engaged by the pin.

9. The combination, with a tool-holder comprising two members, one of which is reciprocative and rotative relatively to the other, said member having a recess or perforation, of a yielding stop adjacent to said recess or perforation; and a pin carried by the other member and adapted to enter the recess or perforation and also to engage said stop, substantially as and for the purpose specified.

10. The combination, with a tool-holder comprising two members one of which is reciprocative and rotative relatively to the other and is recessed or perforated, of a projection carried by one of said members; a yielding stop mounted on the other member and adapted to be engaged by said projection; and a spring for normally holding the two members in contact.

11. The combination, with a tool-holder comprising two members, one of said members having a socket, of a stem carried by the other member and fitting in said socket; a projection carried by one member and adapted to fit in a recess of the other member; a yielding stop adapted to be engaged by the projection; and a spring bearing against a collar on the stem and serving normally to hold the two members in contact.

12. A tool-holder comprising two members, one of which is reciprocative and rotative relatively to the other, one of said members having a pin and the other a yielding stop adapted to be engaged by said pin; and means carried by the member which supports said stop for holding the latter against rotation.

13. The combination, with a tool-holder comprising two members, one of which is reciprocative and rotative relatively to the other, one of said members having a socket, of a yielding stop having a slotted shank fitted in said socket; a pin on the other member adapted to engage said stop; and a device entering the slot of said shank for preventing the stop from turning.

14. The combination, with a reciprocative slide and with means for actuating said slide, of a tool-holder mounted on the slide; means comprising two members, one of which is reciprocative and rotative relatively to the other

and is adapted to carry a screw-cutting tool, one of said members being provided with a series of recesses or perforations; a series of pins carried by one member and adapted to fit in recesses or perforations of the other member; means for adjusting said pins; a series of stops on one of the members adapted to be engaged by said pins; a chuck-spindle; and means including reversing mechanism for operating said spindle, substantially as and for the purpose specified.

15. The combination, with the turret-slide of a lathe, of a turret carried by the slide; a chuck-spindle; means including reversing mechanism for operating said spindle; a tool-holder consisting of two members, one of which is reciprocative and rotative relatively to the other, carried by the turret; a pin or projection carried by one member and entering a recess or perforation in the other member; means for adjusting said pin; and a stop for engaging said pin when the latter is withdrawn from said recess or perforation, substantially as and for the purpose specified.

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