No. 636,009. Patented Oct. 31, 1899.

W. J. SMITH.

TAP.

(Application filed Mar. 4, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

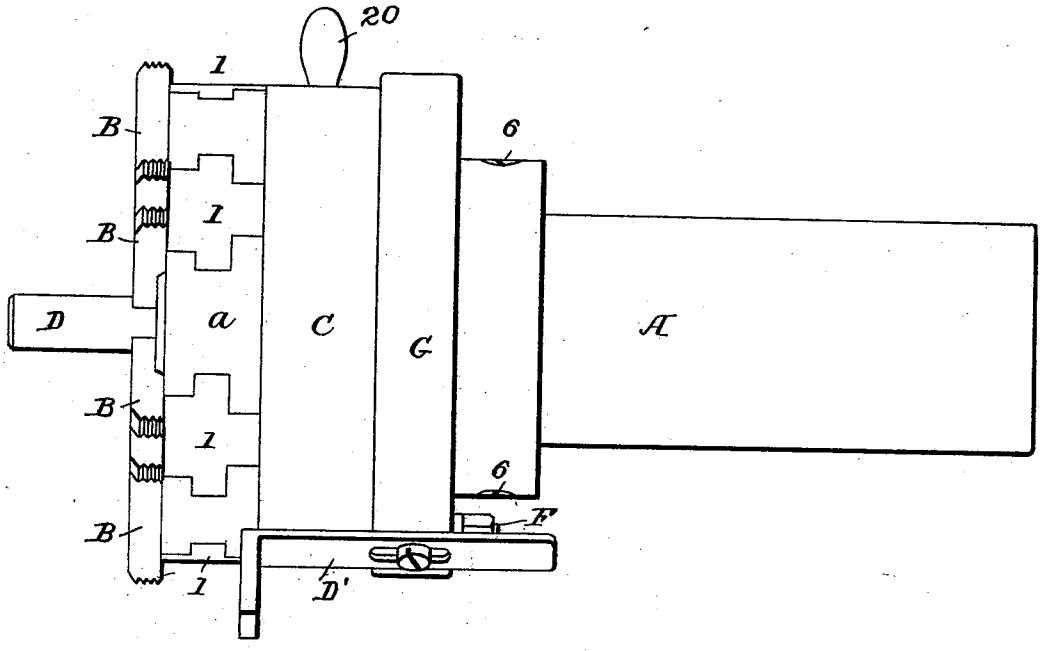

Fig. 2

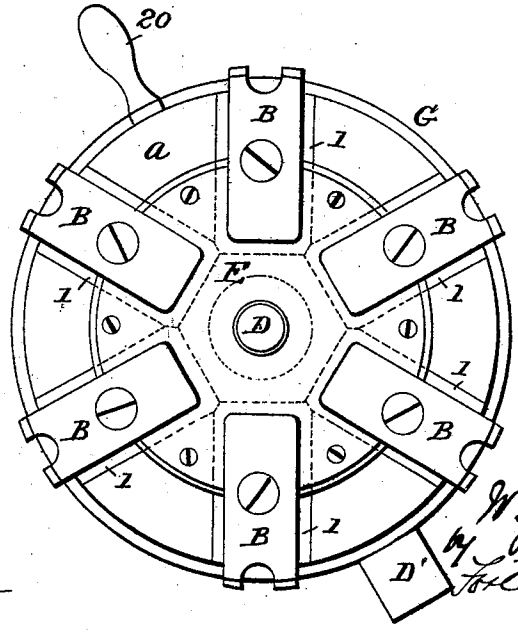

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Fig. 3.

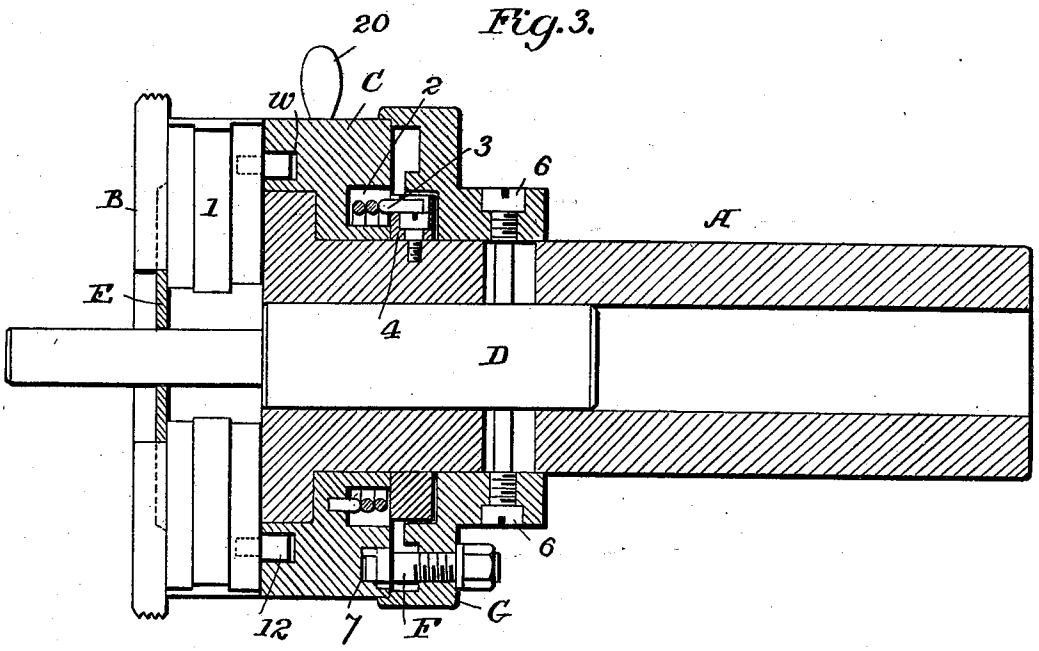

Fig. 4.

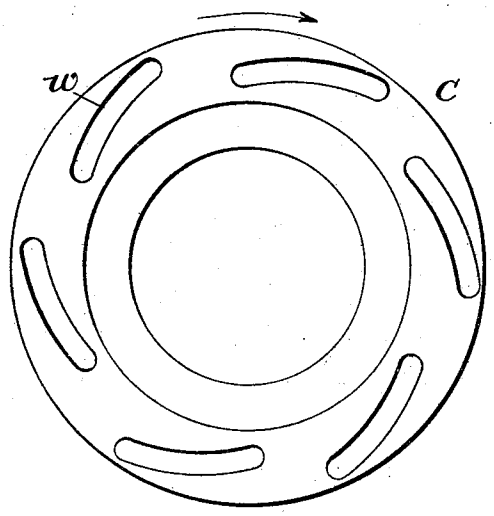

Fig. 5

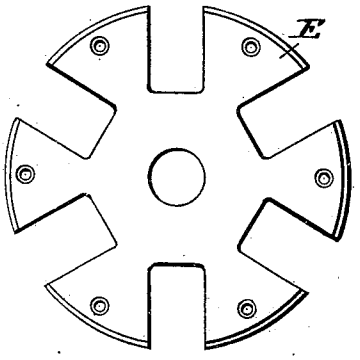

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Fig. 6.

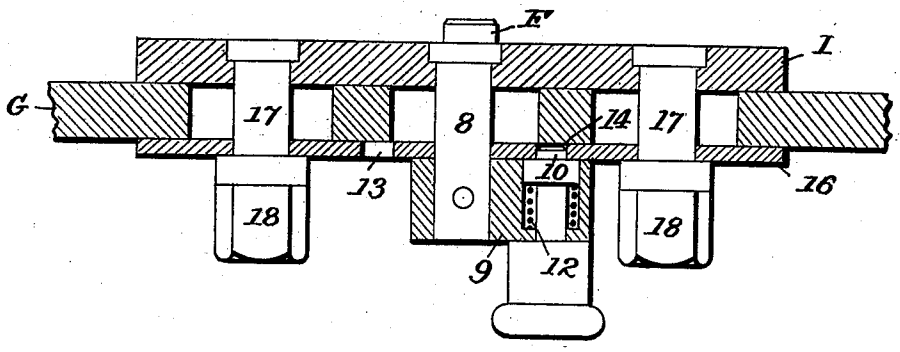

Fig. 7.

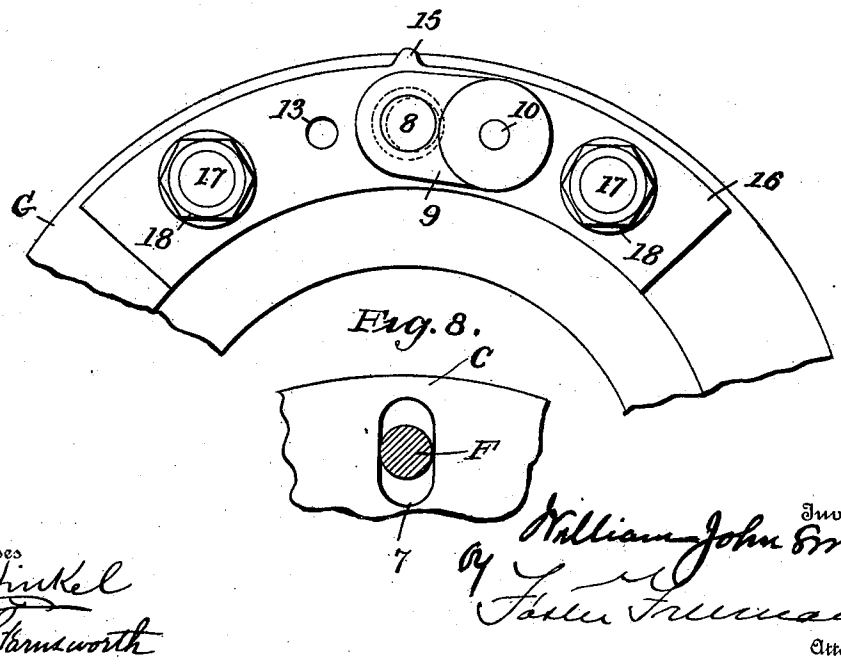

Fig. 8.

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UNITED STATES PATENT OFFICE.

WILLIAM JOHN SMITH, OF NEW HAVEN, CONNECTICUT.

TAP.

SPECIFICATION forming part of Letters Patent No. 636,009, dated October 31, 1899.

Application filed March 4, 1899. Serial No. 707,796. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JOHN SMITH, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Taps, of which the following is a specification.

My invention relates to taps for cutting threads in nuts and sockets of different articles; and my invention consists of a tap provided with cutters having cutting edges at their outer ends, radially adjustable, and with means for locking them in their outer or cutting position, with means for simultaneously retracting them either by hand or mechanically, and with means for setting them to cut to different depths, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a side view of my improved tap. Fig. 2 is an end view. Fig. 3 is a longitudinal section. Fig. 4 is a face view of the cam. Fig. 5 is a detached view of the face-plate. Fig. 6 is a section illustrating a modification. Fig. 7 is a side view of the parts shown in Fig. 6; and Fig. 8 is a plan view of a portion of the under side of the cutter-actuating cam, showing the radial locking-slot.

The stock A of the tool has an enlarged head *a*, in which there are two or more radial recesses to receive cutters B, which may be in one piece with carrier-blocks 1 or may be adjustably connected therewith, the said cutters having their cutting edges at the outer ends. With these cutters are combined means whereby they may be moved outward to operative or cutting position and locked in said position and whereby they may be unlocked to be then moved inward, thus permitting the tap to be withdrawn longitudinally after cutting a thread in a nut or other object.

Different means may be employed for moving the cutters radially outward and inward and for locking and unlocking the same. As shown, an annular cam or sleeve C is carried by the stock back of the head *a* and is provided with a series of spiral or inclined openings *w*, each of which receives a lug or pin 12, projecting from the back of one of the cutters, so that by turning the cam in one direction or the other the cutters are projected or retracted.

In a recess 2 of the cam is arranged a spring 3, one end of which is connected with the cam and the other with a ring 4, bolted to the stock A. This spring is so arranged that it tends to turn the cam in the direction of the arrow, Fig. 4, thereby carrying all of the cutters inward.

The locking device for holding the cutters in their outer position consists, as shown, of a pin F upon a disk G, sliding without turning on the stock A, the cam C having a radial slot 7, which receives the pin when the cam has been turned to project the cutters. It follows that when the disk G is drawn back, carrying the pin out of the recess, the spring 2 will automatically turn the cam C and retract the cutters. The cam C is provided with a handle 20, by means of which it may be turned against the stress of the spring to bring it to a locking position or may be also turned in the reverse direction if a spring is not used.

In order that the cutters may be automatically retracted as soon as they have traveled for any desired distance in cutting the thread in an opening of a nut or other object, I make use of a contacting device, which is moved on striking part of the object or its support and communicates motion to the locking devices to unlock the cam. As shown, the contacting device is a rod D, sliding in a central opening of the stock and connected with the locking-disk G by means of one or more pins, each passing through the hub of the disk through a slot in the stock and into or against the rod D. This rod is set with its end in proper position to make contact with a part of the object being operated upon or with its support, so as to move inward and release the cam after the tool has operated to a sufficient extent, when the cutters will be retracted, permitting the direct withdrawal of the tool.

Any part of the contact device may be made adjustable, so as to insure the unlocking at the proper moment. For instance, the plate G is secured to the rod D by set-screws 6, of which there may be two, three, or more, which are forced against the rod D to connect the same with the disk after setting the rod at any desired position.

The contact device, instead of consisting of a rod arranged centrally, may consist of a

slotted bar D′, bolted adjustably to the outside of the disk G, and for many purposes the tool is provided with both the contact devices D D′.

To protect the cutting devices, I make use of a face-plate E, having a series of slots radially arranged to receive the projecting portions of the cutters B when the said face-plate is bolted, as shown, to the end face of the head *a* of the stock.

It is sometimes desirable in cutting a deep thread to do so by two operations, setting the cutters radially in one position for the roughing cut and moving them slightly outward for the finishing cut. This may be effected by securing the locking-pin F to a plate I, which is an annulus fitting around the stock A between the cam C and locking-ring G. This plate is connected adjustably to the disk G by means of pins 17, passing through slots in the disk, and with outer threaded ends carrying nuts 18, by which the parts are clamped in position after adjustment. While this arrangement is effective, it is attended with the disadvantage that the nuts must be loosened and the parts nicely adjusted by a gage or otherwise, and the nuts then tightened to effect each adjustment of the cutters. To overcome this defect, I provide the locking-pin and its support with an operating-handle which may be turned or set to two or more positions to alter the position of the pin. Thus the pin F may, as shown in Figs. 6 and 7, be set eccentrically upon a shaft 8, provided with a crank-handle 9, by turning which the pin may be set to one position for the preliminary cut and to another position for the second cut, the radial slot 7 permitting the necessary movement of the pin F without withdrawing the latter from the slot, and it is obvious that the handle may be turned in either direction, and thus adjust the cutters inwardly or outwardly, according to the direction in which said handle is turned, the pin thus serving the double function of adjusting and also locking the cam. To secure the parts after adjustment, the crank-handle may carry a sliding bolt 10, pressed inward by a spring 12 and adapted to either of two openings 13 14.

Preferably the shaft 8 is carried by the plate I and extends through a slot in the disk G and also through a plate 16, which carries a pointer 15, movable over graduations at the edge of the disk G when the plate I is adjusted.

Without limiting myself to the precise construction and arrangement of parts shown, I claim as my invention—

1. The combination with the radially-movable cutters of a screw-thread-cutting tool, an operating-cam and cam-actuating means, of a relatively-fixed but adjustable locking-pin to engage the cam and prevent movement of the latter in either direction, and an operating-handle for the locking-pin movable to different positions to shift the position of the locking-pin in the arc of a circle and with it the cam, substantially as described.

2. The combination with the radially-movable cutters of a screw-thread-cutting tool, of an operating-cam, and cam-actuating means, and an adjustable cam-locking device constructed to have movement in either direction and provided with an operating-handle movable to different positions to shift the locking device and with it the cam, substantially as described.

3. The combination with the radially-movable cutters of a screw-thread-cutting tool, of an operating-cam, actuating means for said cam, a locking-pin engaging said cam and provided with an operating-handle movable to different positions to change the position of the locking-pin without disengaging it from the cam and thereby effect the adjustment of the cam, substantially as described.

4. The combination with the radially-movable cutter of a screw-thread-cutting tool, of an operating-cam provided with a radial locking-slot, actuating means for cam, and a locking device for the cam comprising a shaft mounted to turn in a non-rotatable support and carrying an eccentrically-set pin engaging the said radial slot, and means to turn the shaft in its support, substantially as and for the purpose set forth.

5. The combination with a stock provided with radially-movable cutters, of a cam supported to turn on the stock to actuate the cutters, and a locking device for the cam comprising a shaft mounted to turn in a non-rotatable support and carrying an eccentrically-set pin to engage the cam and lock it against turning movement on the stock, and means to turn the shaft in its support, substantially as and for the purpose set forth.

6. The combination of a stock provided with radially-movable cutters, a cam supported to turn on the stock to actuate the cutters, a non-rotatable sleeve slidably supported on the stock adjacent to the cam, a shaft supported to turn in the sleeve, a locking-pin eccentrically set on the end of the shaft and adapted to engage the cam and lock the latter against turning movement on the stock, and means to turn the shaft in its support, substantially as and for the purpose set forth.

7. The combination of a stock provided with radially-movable cutters, a cam supported to turn on the stock to actuate the cutters, a non-rotatable sleeve slidably supported on the stock adjacent to the cam, a shaft supported to turn in the sleeve, an eccentrically-set pin on the end of the shaft and adapted to engage the cam to lock the latter against turning movement on the stock, means to turn the shaft to adjust the position of said pin, and means to lock the shaft in adjusted position, substantially as and for the purpose specified.

8. The combination of a stock provided with radially-movable cutters, a cam support-

ed to turn on the stock to actuate the cutters, a non-rotatable sleeve slidably supported on the stock adjacent to the cam, a plate I, adjustably connected to the sleeve, a shaft supported to turn in said plate and movable therewith relatively to the sleeve, an eccentrically-set pin on the end of the shaft adapted to engage the cam and lock the latter against turning movement on the stock, means to turn the shaft in its support to adjust the locking position of the pin, and means to lock the shaft in adjusted position, substantially as and for the purpose set forth.

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

WILLIAM JOHN SMITH.

Witnesses:

CHARLES E. FOSTER,

PAUL W. STEVENS.