(No Model.)

3 Sheets—Sheet 1.

P. MILLER.

HOLLOW AUGER.

No. 332,274. Patented Dec. 15, 1885.

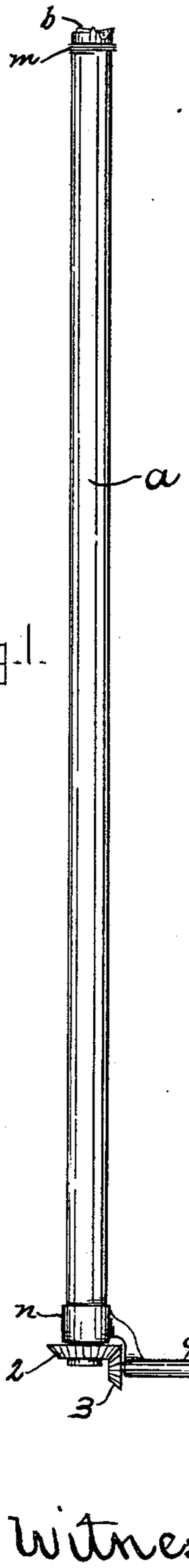


Fig. 1.

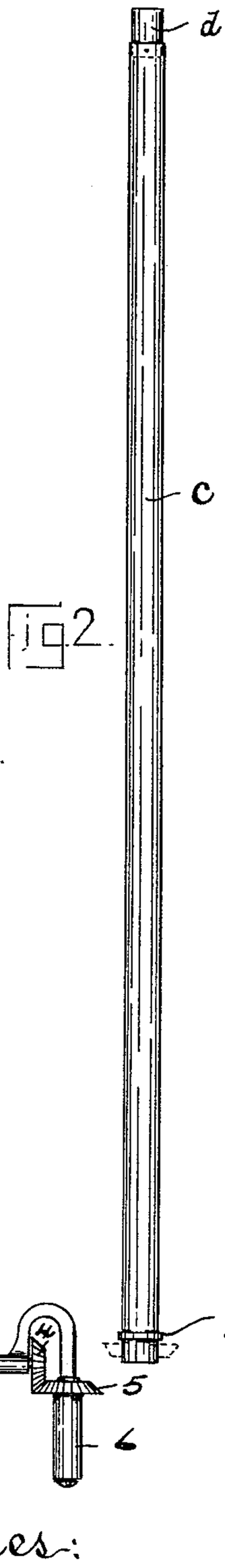
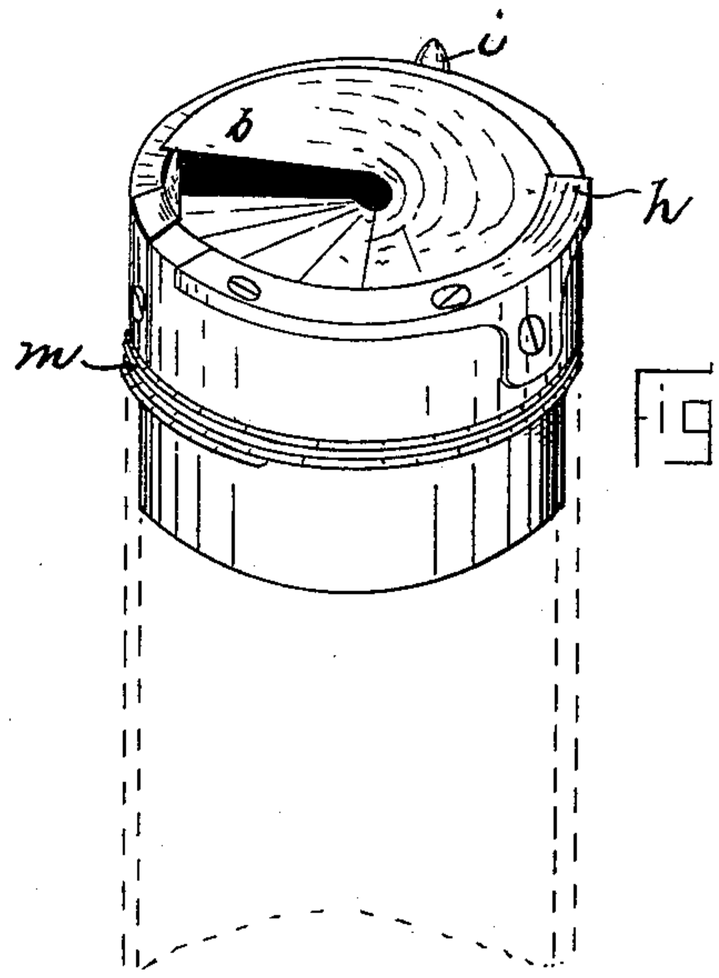


Fig. 2.



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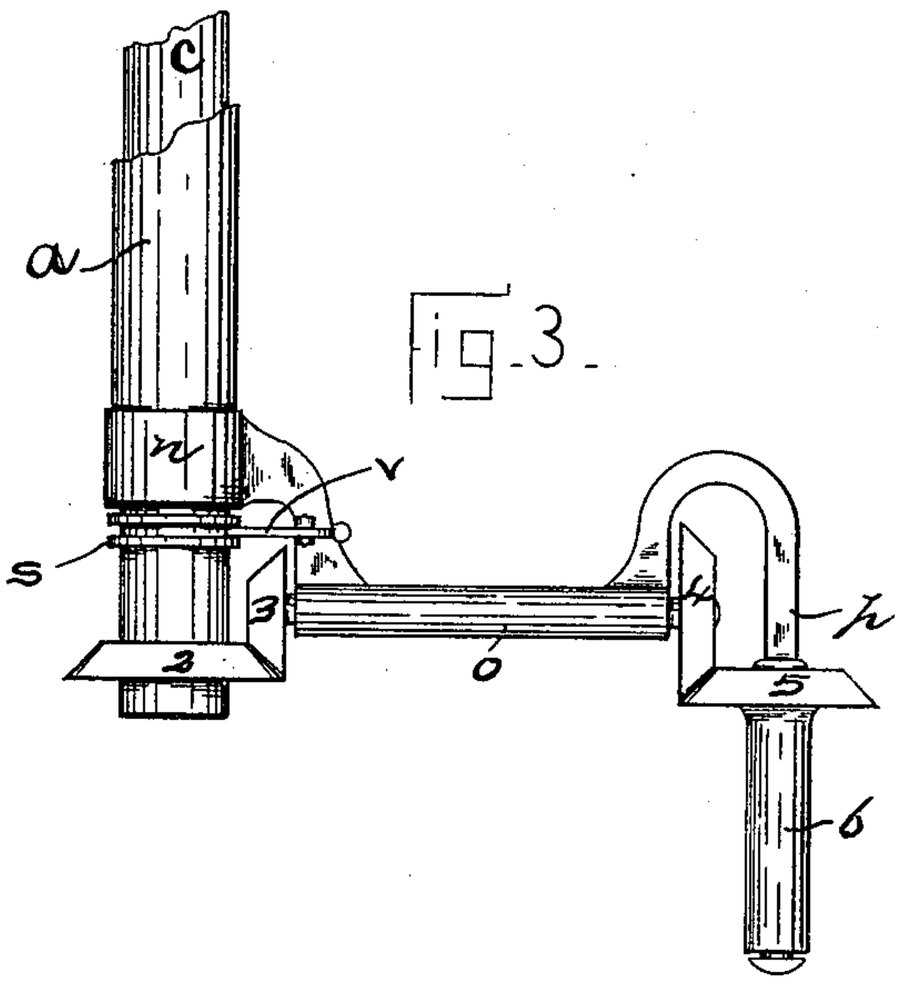

Fig. 3.

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(No Model.)

3 Sheets—Sheet 2

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HOLLOW AUGER.

No. 332,274. Patented Dec. 15, 1885.

Fig. 5.

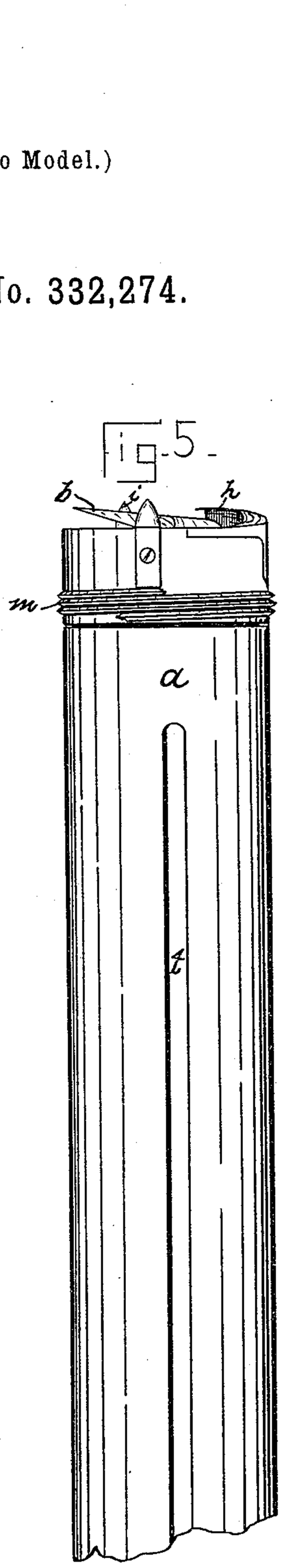


Fig. 8.

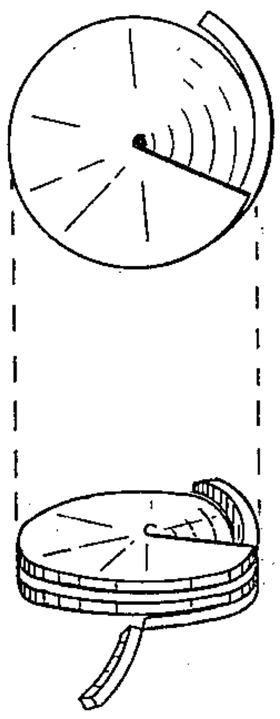


Fig. 7.

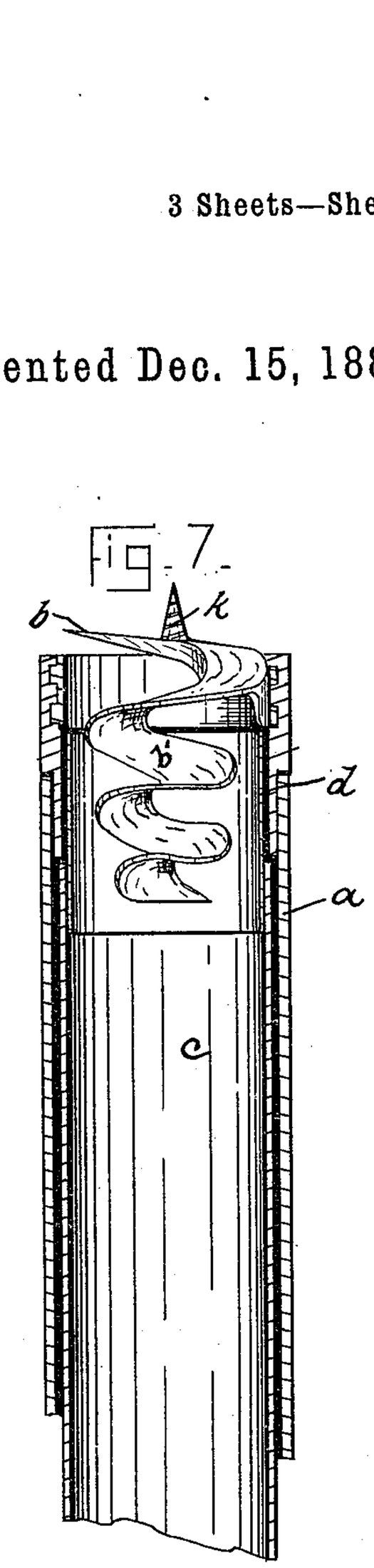
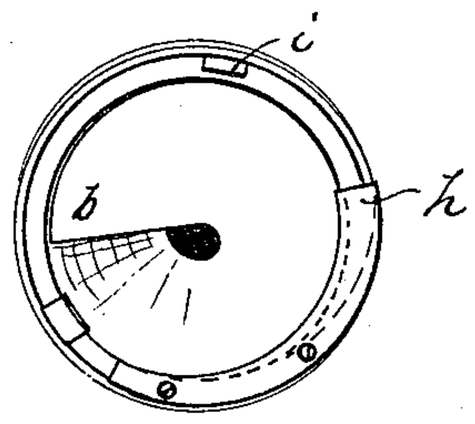


Fig. 6.



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(No Model.) 3 Sheets—Sheet 3.

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HOLLOW AUGER.

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Fig. 10.

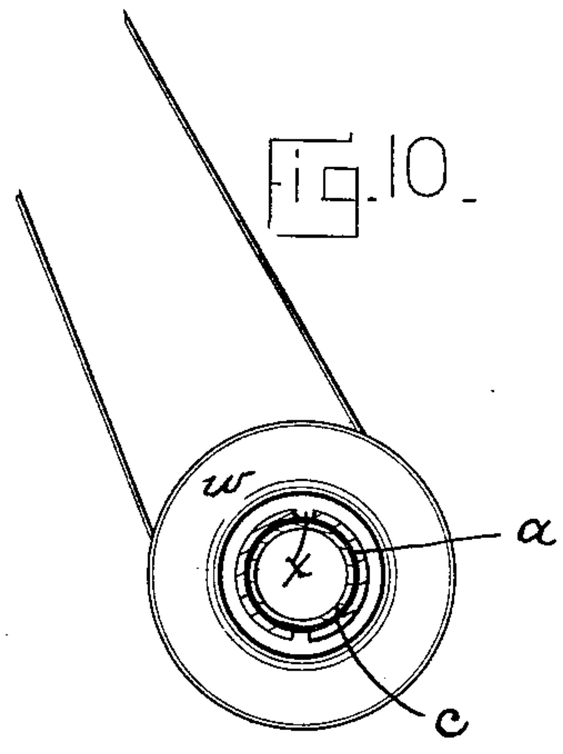


Fig. 9.

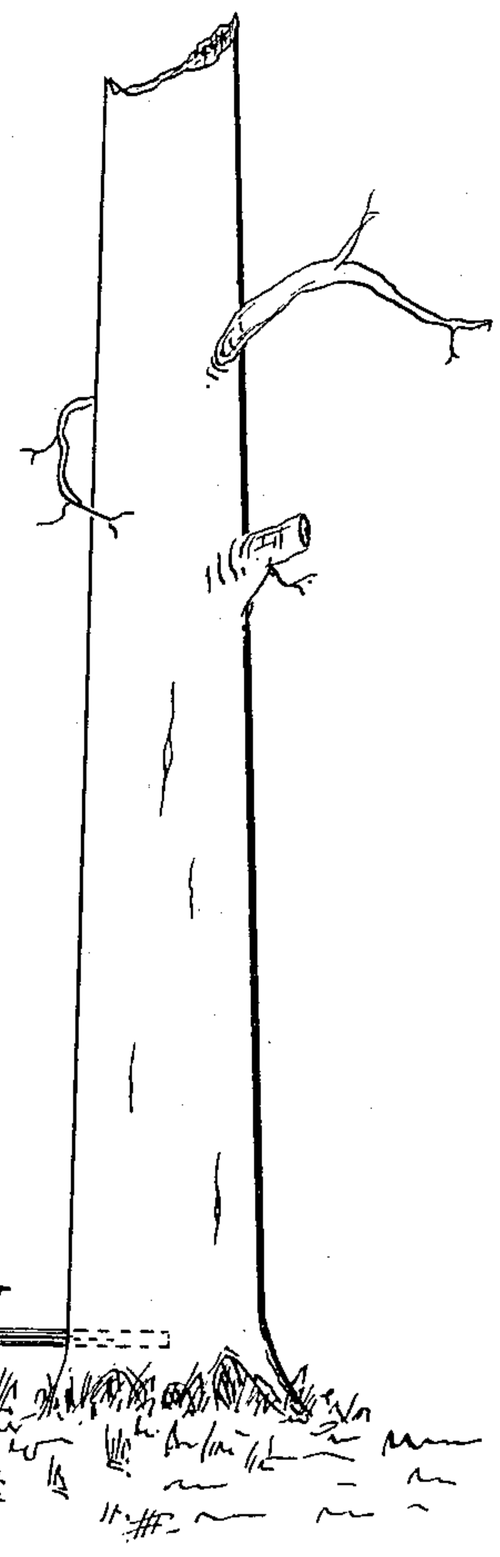
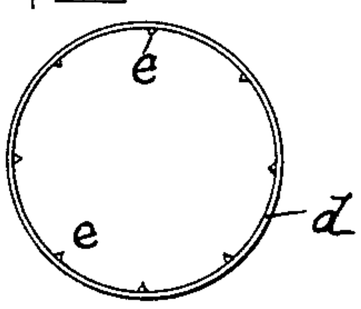
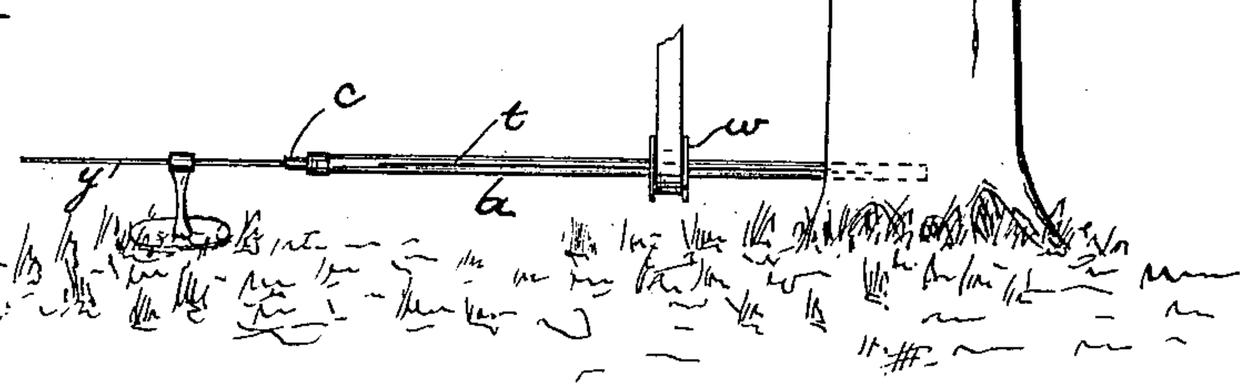


Fig. 11.





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UNITED STATES PATENT OFFICE.

PHILIP MILLER, OF NORWICH, CONNECTICUT.

HOLLOW AUGER.

SPECIFICATION forming part of Letters Patent No. 332,274, dated December 15, 1885.

Application filed September 14, 1885. Serial No. 177,003. (No model.)

To all whom it may concern:

Be it known that I, PHILIP MILLER, a citizen of the United States, residing at Norwich, in the county of New London and State of Connecticut, have invented certain new and useful Improvements in Augers, which improvements are fully set forth and described in the following specification, reference being had to the accompanying drawings.

My improvements relate, principally, to wood-boring tools, and are in that class commonly known as "hollow augers."

My purpose is to provide a tool by means of which holes of great length may be bored without being compelled to remove the auger to clear away the chips, thereby effecting a saving of fully one-half of the time now required.

My invention also includes certain details of construction, which are fully illustrated, and are explained hereinafter.

In the three sheets of drawings which form a part of this specification, Figure 1 is a general view of my complete device as constructed to be operated by hand, and Fig. 2 represents the inner tube, *c*, removed. Fig. 3 is an enlarged view of the outer end of said device, showing a means for holding the inner tube within the outer shell, somewhat different from the means employed in Fig. 1, but substantially the same in general principle. Fig. 4 is an enlarged perspective view of the cutting-head as formed for boring endwise of the grain. Fig. 5 is a side elevation of said cutting-head attached to a section of the outer shell. Fig. 6 is an end view of the same; and Fig. 7, a longitudinal sectional view of the tubes, (both outer and inner,) and is intended to illustrate the internal construction of the cutting-head and the means provided to convey the chips back into the still (non-rotatable) tube *c*. Fig. 8 shows both endwise and perspective views of a section of the chips or core as it appears after boring. Fig. 9 represents my device as it appears when used to bore through a standing tree with steam or other similar power; and Fig. 10 is an enlarged detached view of the pulley then made use of, and explains the manner in which I attach said pulley to the outer shell, *a*. Fig. 11 is an end view of the throat-section *d*, showing the V-shaped internal ribs which serve to guide the core and keep it from rotating within said throat.

Briefly described, said improved auger consists of a cutting-head of peculiar construction, secured to a tube or cylinder slightly smaller than the hole to be bored. Within this outer tube is a smaller tube, which is kept from rotating by mechanism hereinafter referred to. The chips are carried into the inner still tube as fast as cut, and are gradually forced outward, the construction being such that there is no inclination on the part of said chips to wedge and choke the hole, as in ordinary hollow augers.

Referring to the several drawings, the letter *a* represents the outer tube, made preferably of brass. The cutter-head, which forms the auger proper, is screwed or otherwise secured within one end of said tube *a*, and its cutting portions are so formed that the usual spiral chip is produced, also a clearing-chip, which is substantially like a spiral spring formed of square wire. (See Fig. 8.) The cutting-lip *b* is of the same general shape as that now commonly used in auger-bits, and needs no detailed description. The twist *b'*, which begins with said lip *b*, follows inward, preferably, three or four coils, although it may, if desired, be extended throughout the greater portion of the tube, the office of said twist being to force the spiral chips into the non-rotatable tube *c*, which is formed of any non-corrodible metal, and is provided at its inner end with a short tube, *d*, of slightly-smaller diameter, and which forms a throat, through which the chips are forced, said chips being prevented from rotating while in said throat-section by a series of V-shaped longitudinal ribs, *e*. As soon as the core of chips passes from the throat *d* into the slightly-larger tube *c* it is easily forced outward by the continually-entering chips. In order to cut a hole large enough to receive the outside tube, and at the same time dispose of the chip thus cut through the inner tube, (which is necessarily very much smaller than said hole,) I have provided a pod-cutter, *h*, whose outer cutting-edge extends slightly beyond the periphery of the cutter-head proper. This pod-cutter *h* begins to cut at the extreme periphery of the cut made by lip *b*, and cuts an annular or

ring-shaped chip, which is preferably stripped or divided lengthwise into two sections by a spur-cutter, *i*, located just ahead of said pod-cutter. We now have a flat continuous spiral chip made by cutter *b*, also one or more narrow spiral chips made by the pod-cutter *h*, and it is obvious that some means must be provided to dispose of both of said chips without clogging or choking the tube *c*. The flat chip made by cutter *b*, I have already stated, is carried inward by the twist above described. In order to also dispose of the narrow outer chip I have formed the inner wall of the pod-cutter *h* as an inclined way leading gradually into the twist, (see concentric dotted lines in Fig. 6,) and I have also made the pitch of said twist considerably greater than the feed-screw, so that the outer spiral chip may alternate with or be sandwiched between the folds of the flat chip as they pass together into the throat *d*. (See Fig. 8.) It will now be understood that the narrow clearing-chip, although originally cut as a much larger circle than the inner flat chip, is finally bent or sprung inward until it is brought to the same diameter as said flat chip, and the two then travel slowly through the inner (still) tube together. The ordinary central feed-screw, *k*, Fig. 7, may be used, or an external thread, *m*, as preferred. The latter is particularly valuable when boring endwise with the grain; but when used a hole must first be started with an ordinary auger.

Having described the cutting portion of my device, I will now proceed to describe the means employed to rotate the auger and to hold the inner tube still.

n represents a collar secured to the outer end of tube *a*, and having formed as an integral part thereof an arm which supports a tubular arm, *o*, at a right angle to tube *a*. This tubular arm *o* supports in turn an arm, *p*, parallel with tube *a*, and intended to be used as a crank by which the operator may obtain sufficient leverage to rotate the auger. The inner tube, *c*, is held in a central position in the outer tube, *a*, by an annular flange, *q*, which rests in the counterbored outer end of collar *n*. Secured on the outer end of tube *c* is a beveled gear, 2, which engages a corresponding gear, 3, on a shaft which passes through the tubular arm *o*. Said shaft has on its outer end a similar gear, 4, which engages gear 5, formed on a tube, 6, which is supported by the arm *p*, and forms the handle of the operating-crank. As the crank is turned this handle 6 is held firmly by the operator, and, being thus kept from rotating, acts through the train of gears to hold the tube *c* in a given position while the outer tube, *a*, travels around it, as will be understood by referring to Figs. 1 and 3.

The inner tube, *c*, is prevented from working outward (in Fig. 1) by the engagement of gears 2 and 3, gear 2 being placed on the inner side of its companion gear. In Fig. 3 I have shown gear 2 as placed on the outside of gear 3, and have provided on tube *c* a collar, *s*, having a groove which receives a latch, *v*. By simply throwing said latch out of the groove the inner tube may be immediately withdrawn with its load of chips without disturbing the auger proper.

In Fig. 9 my improved form of auger is utilized to bore through a standing tree to provide a hole for a certain form of saw patented by me October 21, 1884, No. 306,850. I have found it economical in boring a large number of holes of great length to apply steam or other similar power to rotate the auger, and have provided as a simple and inexpensive means for communicating such power a pulley, *w*, which slips freely onto the outer tube, *a*, and is kept from rotating on said tube by one or more internal lugs, *x*, which project into longitudinal slots or key-seats *t* in said outer tube. As the auger is rotated the feed-screw draws it into the tree and tube *a* travels slowly lengthwise through the pulley, the inner tube, *c*, being meanwhile kept from rotating by a square rod, *y*, which is supported by a suitable bearing, through which it travels to correspond with the longitudinal movement of the auger proper.

I have stated above that the inner tube, *c*, should be made of non-corrodible metal. If made of material that could rust or become roughened on its inner surface, the consequent increase of friction would prevent the core of chips from moving freely through said tube; but if said inner surface is smoothly finished the chips, after passing through the somewhat smaller throat-section, slide easily through tube *c*.

Having described my invention, I claim—

1. An auger of the class herein referred to, consisting of an outer barrel or shell, to which is secured a cutting or boring head, and an inner non-rotatable tube adapted to receive the chips from said cutting or boring head and discharge the same through its free end, substantially as described.

2. In combination with an outer shell and a cutting-head of the form described, an inner removable tube concentric with said outer shell, said inner shell being held from rotating by a system of gears and crank, substantially as described, and for the object specified.

3. In combination with an outer shell having secured thereto a cutting-head of the form described, an inner removable tube concentric with said outer shell and having the end which enters the cutting-head slightly reduced in diameter, as described, to form a throat, through which the core of chips enters said inner tube.

4. In combination with the outer shell, *a*, a cutting-head of the form described, secured to said outer shell, and the inner removable tube, *c*, having the throat-section *d*, said throat-section being provided with a series of internal longitudinal V-shaped ribs, as described, and for the purpose specified.

5. The tube *a*, having secured to one end a suitable cutting-head and to the opposite end a fixed collar, *n*, having an integral crank-

frame, *o p*, as described, an inner tube, *c*, concentric with tube *a*, carrying on its free end a beveled gear, 2, a shaft adapted to rotate within section *o* of the crank-frame, carrying at one end a gear, which engages gear 2, and at its opposite end a beveled gear, 4, as described, and a tube adapted to rotate on section *p* of said crank-frame, carrying a gear, 5, adapted to engage said gear 4, all of said elements being combined substantially as and for the object specified.

6. In combination with the outer shell, *a*, and a cutting-head, substantially as described, secured to said shell, a counterbored collar secured to said shell at the end opposite to said cutting-head, and an inner tube of the form described, having a flange capable of engagement with said counterbored collar to hold the inner tube concentric with the outer shell.

7. In combination with shell *a*, collar *n*, frame *o p*, and a latch pivoted in said frame, substantially as described, the inner tube, *c*, having at its free end a flanged collar capable of engagement with said latch, in the manner specified, and for the purpose stated.

8. An outer shell forming the barrel of the auger, a cutting-head secured thereto, having both a cutting-lip, *b*, and twist for conveying the chips into the tube, as described, and provided, also, with a pod-cutter capable of producing a cut whose diameter is slightly greater than the diameter of the shell *a*, and whose inner wall is so formed that the chip thus cut is forced inward and sandwiched between the folds of the flat chip produced by lip *b*, all being combined substantially as and for the objects set forth.

PHILIP MILLER.

Witnesses:
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WILLIS W. CLARKE.