

No. 697,584.

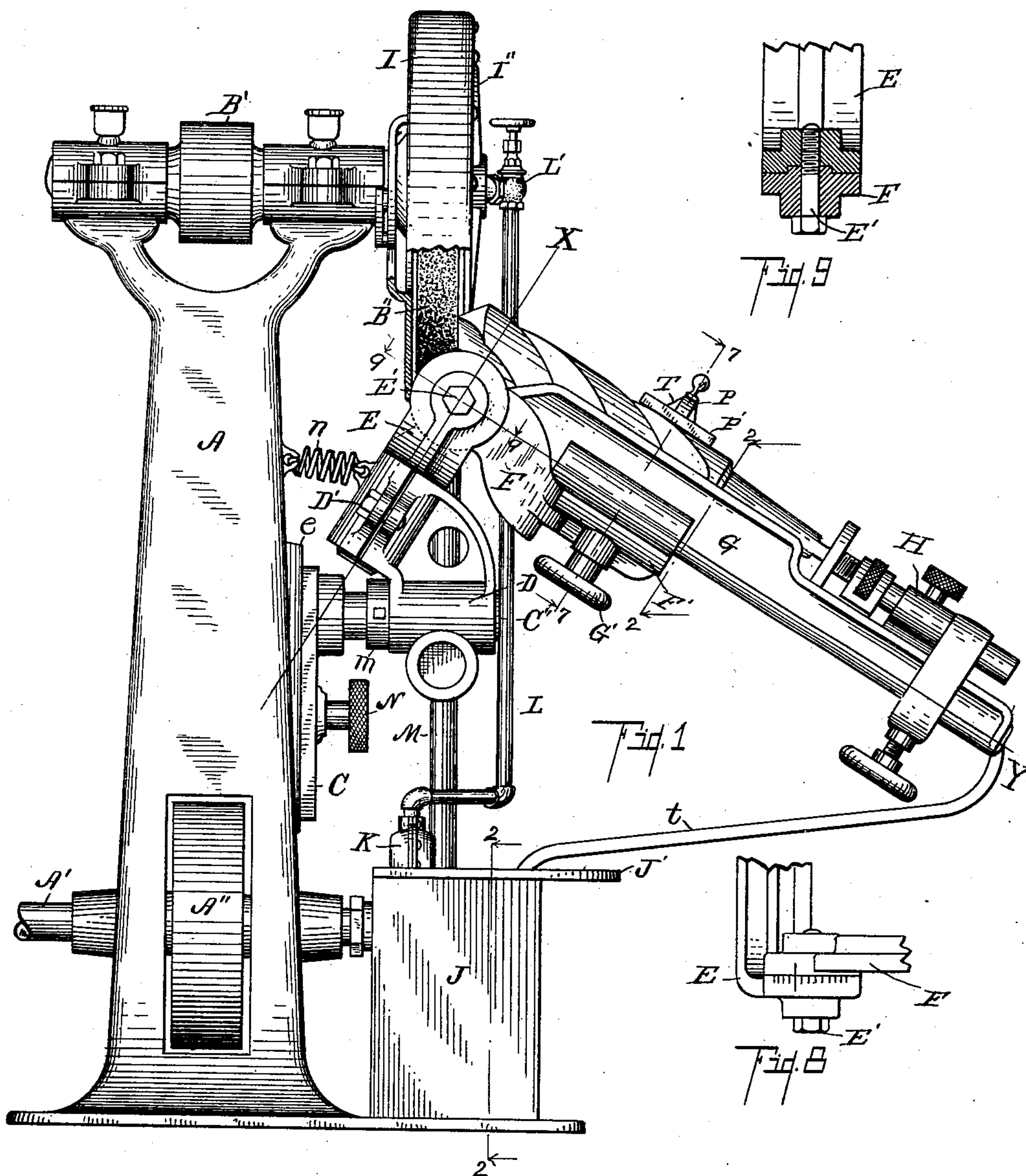
Patented Apr. 15, 1902.

H. P. WHITE.  
DRILL GRINDING MACHINE.

(Application filed Apr. 3, 1900.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses:

*S. A. Earl.*  
*Otis A. Earl.*

Inventor,

*Henry P. White*  
By *Fred L. Chappell*  
Att'y.

No. 697,584.

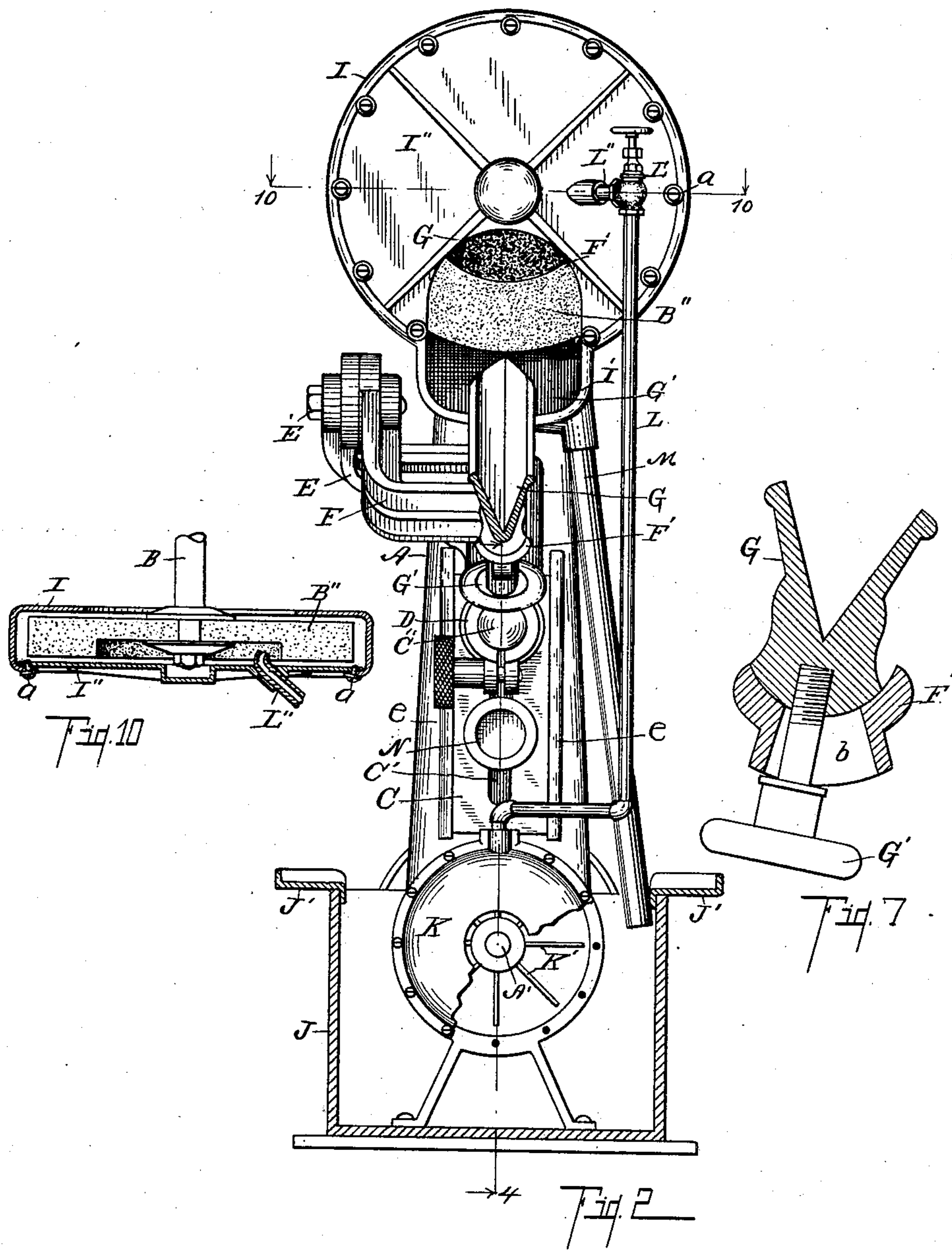
Patented Apr. 15, 1902.

H. P. WHITE.  
DRILL GRINDING MACHINE.

(Application filed Apr. 3, 1900.)

(No Model.)

4 Sheets—Sheet 2.



Witnesses:

*S. A. Earl*

*Otis A. Earl*

Inventor,

*Henry P. White*

By *Fred L. Chappell*  
Att'y.



No. 697,584.

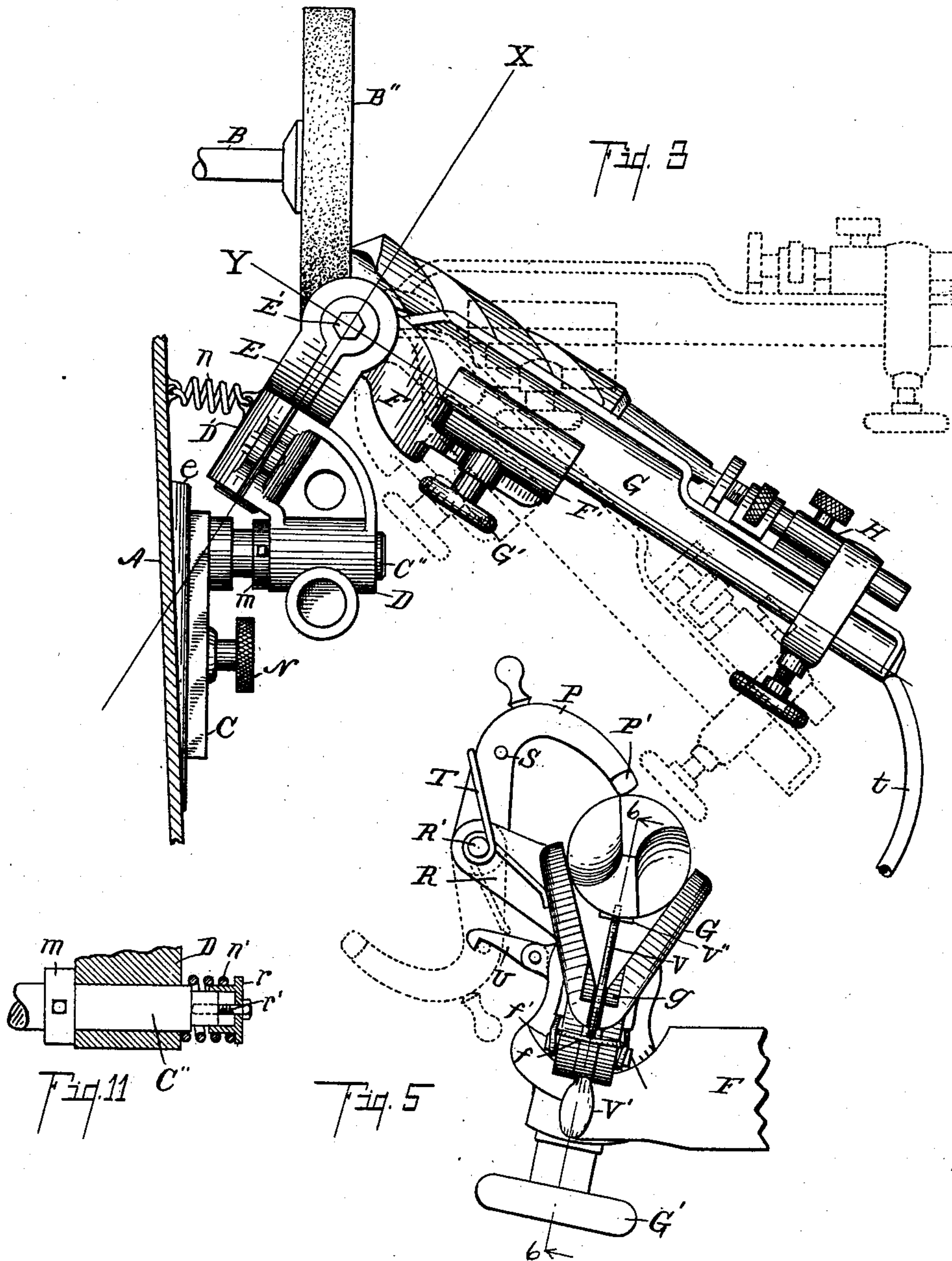
Patented Apr. 15, 1902.

H. P. WHITE.  
DRILL GRINDING MACHINE.

(Application filed Apr. 3, 1900.)

(No Model.)

4 Sheets—Sheet 3.



Witnesses:

*S. A. Earl*  
*Otis A. Earl*

Inventor,

*Harry P. White*  
By *Fred L. Chappell*  
Att'y.

No. 697,584.

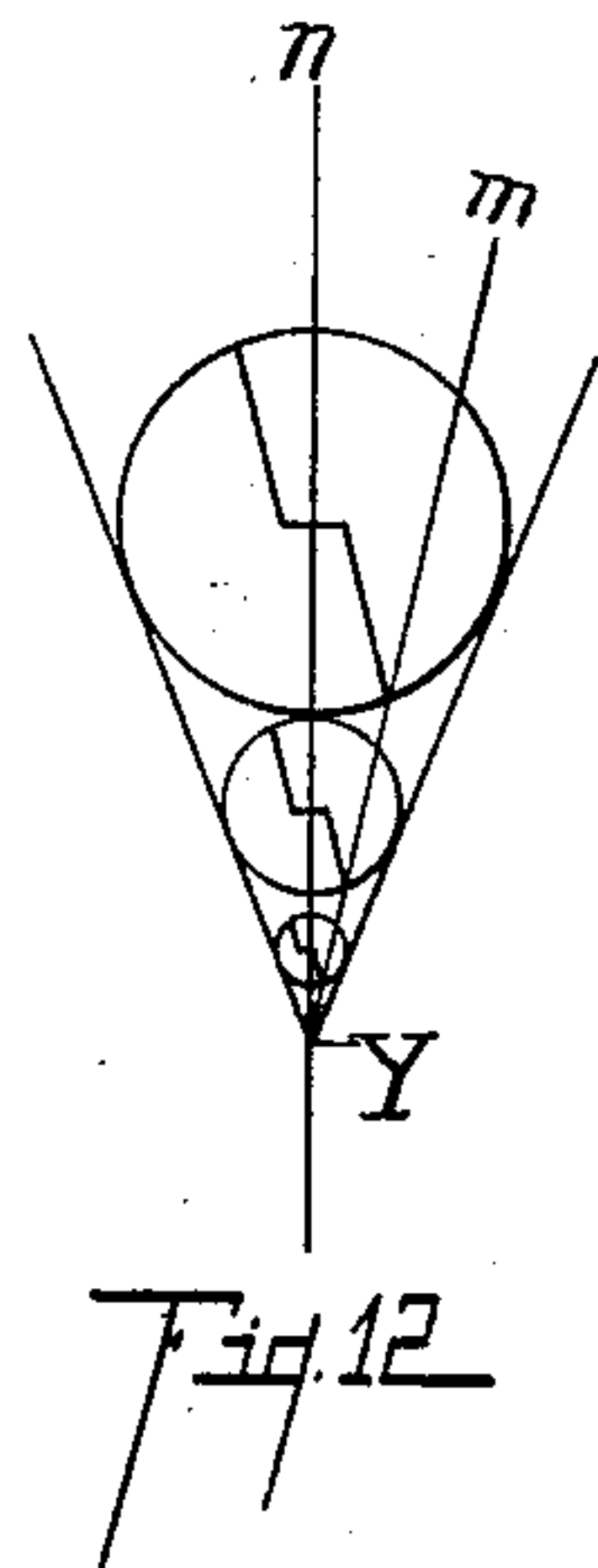
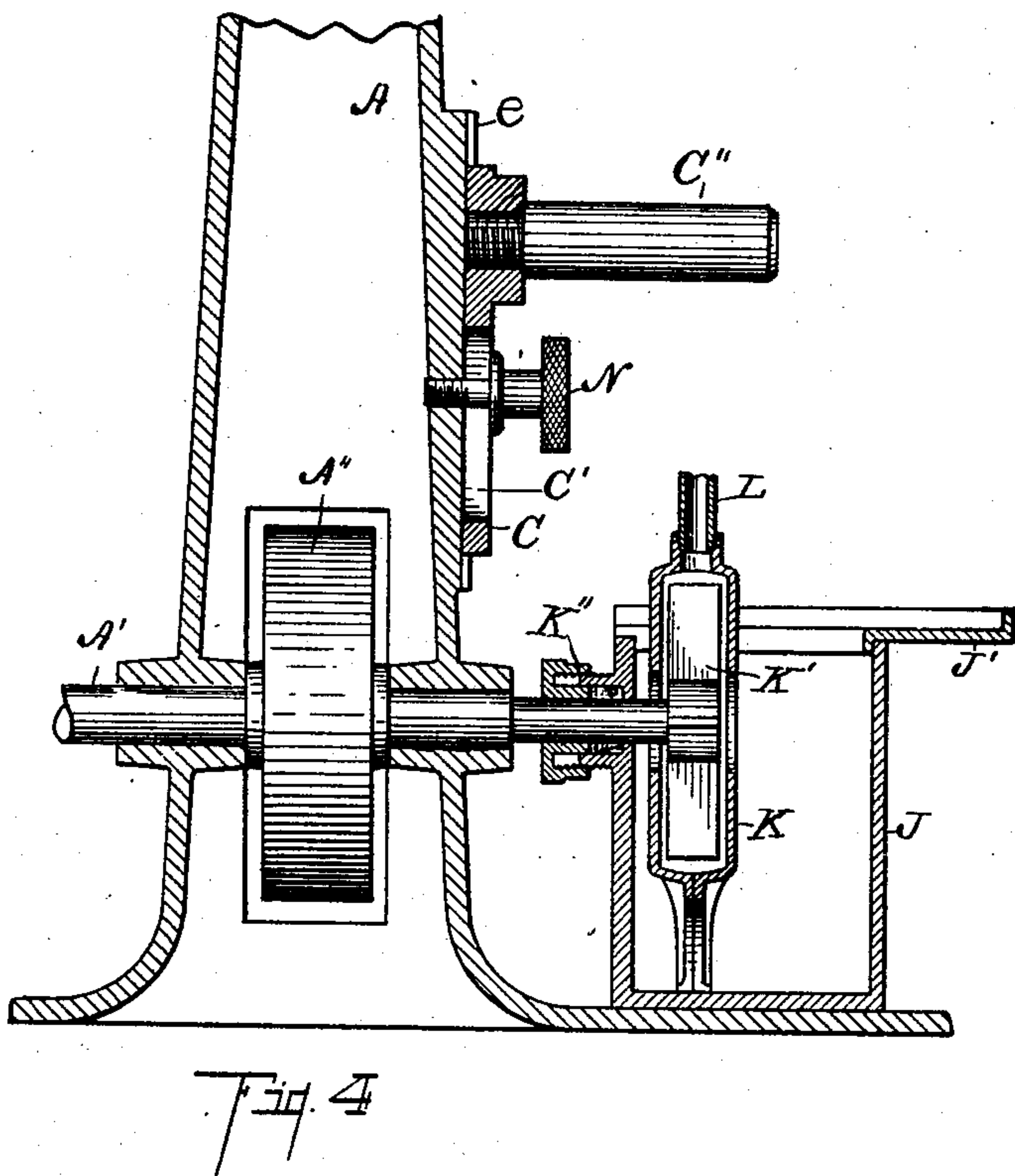
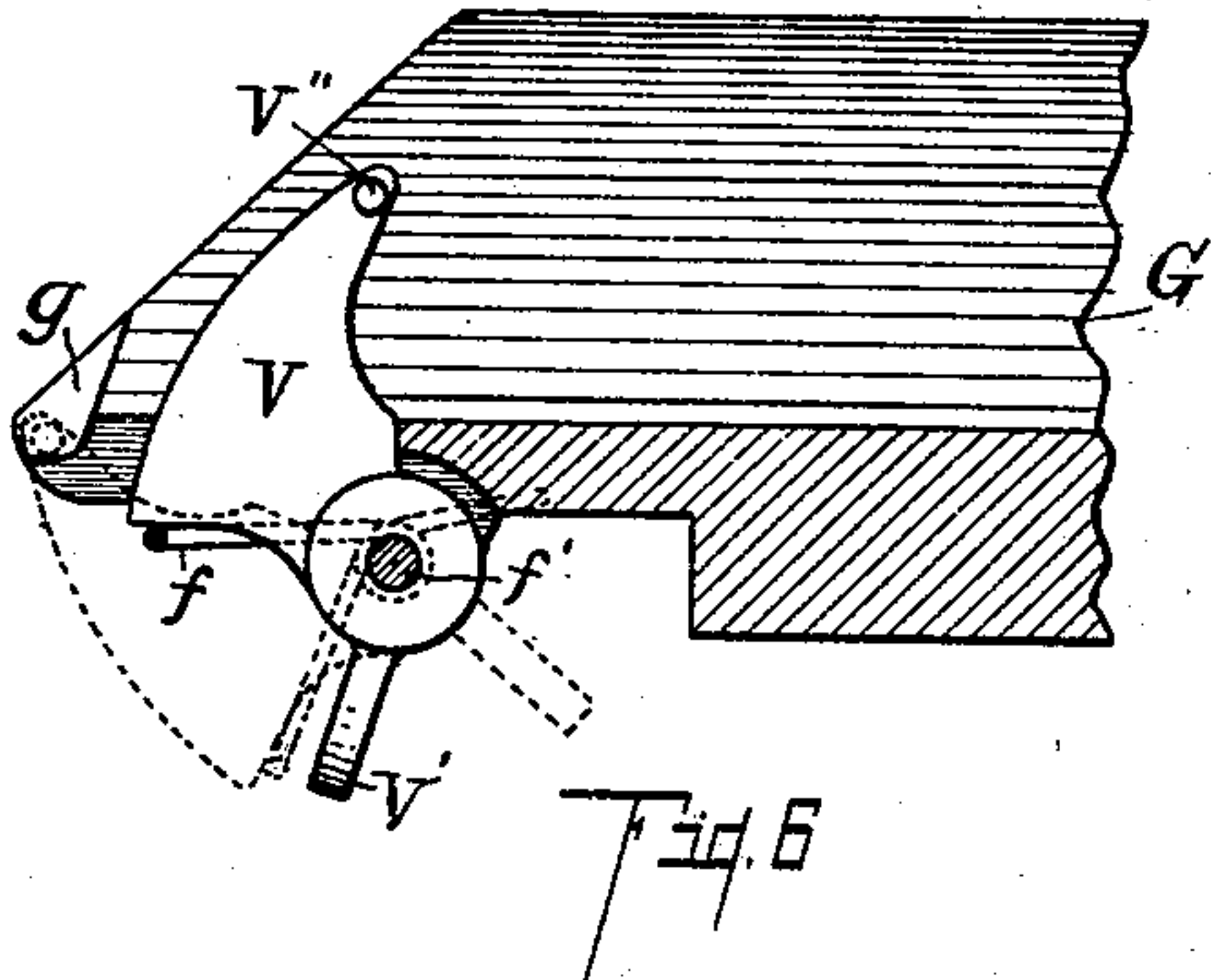
Patented Apr. 15, 1902.

H. P. WHITE.  
DRILL GRINDING MACHINE.

(Application filed Apr. 3, 1900.)

(No Model.)

4 Sheets—Sheet 4.



Witnesses:

*S. A. Earl.*  
*Otis C. Earl*

Inventor,

*Henry P. White*  
By *Fred L. Chappell*  
Att'y.



# UNITED STATES PATENT OFFICE.

HENRY P. WHITE, OF KALAMAZOO, MICHIGAN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE WILMARTH AND MORMAN COMPANY, OF GRAND RAPIDS, MICHIGAN.

## DRILL-GRINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 697,584, dated April 15, 1902.

Application filed April 3, 1900. Serial No. 11,399. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY P. WHITE, a citizen of the United States, residing at the city of Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented certain new and useful Improvements in Drill-Grinding Machines, of which the following is a specification.

This invention relates to improvements in a grinding-machine.

The objects of the invention are, first, to provide in a grinding-machine an improved holder; second, to provide an improved holder for drills, tools, or other articles especially adapted and connected for use in a grinder in which water is used on the grinding-wheel, whereby the water is collected for use again; third, to provide an improved means of retaining a drill in position and preventing its rotation in the holder; fourth, to provide in a grinder an adjustable holder that shall enable the grinding of a drill or other tool or article on any angle desired, so that twist-drills, tools, countersinkers, studs, or anything else can all be ground satisfactorily and accurately at any time in the same machine; fifth, to provide improved means of adjusting the drill-holder, so that a drill placed within the same to be ground can be presented to different parts of the wheel to insure the even wearing of the wheel and, further, to vary the direction of the grinding on the point of the drill when so desired; sixth, to provide improved means of distributing water on a grinding-wheel; seventh, to provide improved means of delivering water to a grinding-wheel, which shall be actuated by the driving mechanism of the grinder and be so constructed that the water delivered to the grinding-wheel can be collected and used over again without danger of wearing the bearings of the pumping device, owing to grit held in suspension in the water.

Further objects will definitely appear in the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in this specification.

The invention is clearly defined and pointed out in the claims.

A machine embodying the features of my invention is clearly illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a detail side elevation of a machine embodying the features of my invention, a portion of the hood surrounding the grinding-wheel being broken away. Fig. 2 is a detail front elevation of the structure appearing in Fig. 1, the drill-holder and the water-tank being shown in section on lines corresponding to lines 2 2 of Fig. 1, a portion of the casing of the pump being broken away. Fig. 3 is a detail elevation view. Fig. 4 is a detail sectional elevation taken on a line corresponding to line 4 4 of Fig. 2, showing the manner of adjusting the drill-holder support and showing the construction of the pump for supplying water for the grinding-wheel. Fig. 5 is an enlarged detail front end elevation of the drill-holder, showing the rest for engaging the flute of the drill and the details of the clamp for retaining the drill in position. Fig. 6 is a detail longitudinal sectional elevation taken on a line corresponding to line 6 6 of Fig. 5. Fig. 7 is a transverse detail sectional view through the V-shaped holder and its support, taken on a line corresponding to line 7 7 of Fig. 1. Fig. 8 is a detail view of the adjusting means for varying the angle of the drill-holder to the face of the grinding-wheel. Fig. 9 is a detail sectional view on a line corresponding to line 9 9 of Fig. 1, showing the same parts as appear in Fig. 8. Fig. 10 is a detail horizontal sectional view through the grinding-wheel, its hood, and the delivery-pipe thereto, taken on a line corresponding to line 10 10 of Fig. 2. Fig. 11 is a vertical detail sectional view of a modified construction of the supporting stud, shaft, or pin C" and its collar, taken on a line corresponding to line 4 4 of Fig. 2. Fig. 12 is a diagrammatic view illustrating the position of twist-drills in the holder when retained from rotation by the improved rest or stop devices here illustrated.



In the drawings the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines, and similar letters of reference refer to similar parts throughout the several views.

Referring to the lettered parts of the drawings, A is the main frame of the machine. Supported in bearings in the lower part of this frame is the driving-shaft A', which carries the driving-pulley A''. Supported in suitable bearings at the top is the shaft B, supported on which is the pulley B'. The grinding-wheel B'', of emery, corundum, grindstone, or other suitable material, is supported on the outer end of this shaft. Surrounding the grinding-wheel is a hood I, having a front plate I'', which substantially surrounds and incases the wheel, except that there is an opening to the lower side of plate I'', preferably sufficiently large to admit the point of a drill held in the holder and permit the manipulation of the same. The grinding-wheels are usually hollowed out at the center. A pipe L delivers water to the center portion of the wheel. The water discharged into the central part is carried by the centrifugal force when the wheel is revolving out onto the grinding-face and thrown into the hood I, which collects it. The water then descends through the pipe M to the supply-tank J. A centrifugal pump is provided within the supply-tank J. A stuffing-box K'' serves as a bearing for the extended end of the shaft A', and on the shaft is supported the rotary head, having paddles K'. These are loosely surrounded by a casing K, so that none of the parts come into contact with each other during the rotation. An aperture is around the shaft into the casing at the center to allow the water to be thrown or drawn in at that point when the machine is in operation. A pipe L delivers up from the top of the pump-casing K. A valve L' is located between it and the pipe L'', which delivers the stream of water to the central part of the grinding-wheel. It is very important to deliver the water into the central portion of the wheel in this way, as it is distributed evenly over the entire face of the wheel. A larger amount of water can be utilized, and of course the cooling clearing lubricating effect of the water can be secured in a much greater degree.

The drill-holder is carried on the stud C''. This stud is secured to a bracket C, which is adjustable up and down in a suitable way *e* by means of the hand-screw N, extending through slots C' therein. By adjusting this up and down the elevation of the holder in its relation to the face of the grinding-wheel is very readily adjusted. The holder is carried on the adjustable bracket D, which embraces the stud C'', where it is adjusted by a suitable hand-screw, which enables it to be swung from side to side, completing its adjustment laterally as well as vertically. An

adjustable collar or stop *m* is on the stud C'' to limit the motion of the bracket D inwardly, and a spring *n* is connected therefrom to the frame normally in contact therewith. This is to keep the parts properly in position when the bracket D is loosened on the stud for the purpose of oscillating the grinder thereon, as I will hereinafter more fully describe.

An oblique journal-bearing D' is provided in the bracket D, which is situated back of the face of the grinding-wheel. This journal bearing or box is adjustable to take up slack and also apply friction to the journal, which extends into it or to clamp the same securely under certain circumstances, as hereinafter pointed out. A bracket E is provided with a suitable journal fitting into this journal-bearing on which the holder oscillates during the grinding of drills, countersinks, and the like. Secured to this oscillating bracket E is a bracket F on a suitable pivot E', the same beingsuitably fitted together to form a strong joint, preferably by being shouldered together, as appears in Fig. 9. The pivot E, which joins the parts together, is screw-threaded, so that by use of a wrench the bracket F can be locked in any desired position in relation to the swinging bracket E.

The bracket F is provided with a curved seat F', and a V-shaped holder G is secured to this curved seat F' by a hand-screw G', extending through the slot *b* in the same, which enables the angle of the V-shaped holder G to be adjusted to any desired position in relation to this supporting-bracket. The drill-holder is adapted to be adjusted to any position desired. Its preferred positions for use, however, are indicated in Figs. 1 and 3, where the full lines show the drill-holder adjusted to grind the point of a twist-drill at the usual angle. The lower position indicated by the dotted lines shows a position of the holder for grinding countersinks and the like, and the upper position indicated by dotted lines shows a position for grinding at right angles the ends of short shafts or studs or for grinding off the end of any small article in the same way. When used in this position to grind off the end of a short shaft, the oblique oscillating journal is clamped securely in position and the bracket D is loosened on the shaft C'', so that the holder oscillates from side to side to insure a proper grinding and even wearing of the face of the stone.

The holder is held normally against the collar *m* by the spring *n*, which draws the sleeve of the bracket against the collar. The tail-stock of the holder is set to the proper length, and the shaft or whatever article desired is placed within and the grinding continued until it is completed, merely oscillating the holder on the stud C'', the remaining parts being stationary. I desire to remark that the holder can be adjusted to different angles and oscillate on this same shaft, grinding chisels, lathe-tools, and other tools at the



proper or any angle required. From this arrangement it will be seen that the grinder is not only perfectly adapted for grinding drills, but is also adapted to grinding tools, ends of shafts, or any other articles requiring an accurate finish.

The holder is made V-shaped and continuous, and the tube *t* is connected to the outer end of the same and passed down to the water-tank J, so that any water coming into the tool-holder readily returns to the supply-tank J, where it can be passed up to the grinding-wheel and used again. This also prevents any slop about the shop, which is always a great annoyance aside from the injury it does metal parts with which it comes in contact.

I provide the drill-holder with a suitable adjustable tail-block H, which is provided with the same adjustments as those defined in my former patent, No. 643,703, dated February 20, 1900.

It is often desirable to clamp the drill in position. This I accomplish by means of the clamp P, (clearly appearing in Figs. 1 and 5,) which is provided with an elongated cross-piece P', which contacts lengthwise with the drill. This is pivoted to an arm R to one side of the V-shaped drill-holder on the pivot R', and a spring T is provided, which holds the same normally in contact with the drill with sufficient force to prevent the longitudinal movement thereof. When it is desired to unclamp the drills, this clamp is turned out at the side, as indicated in Fig. 5, and a pivoted hook U engages with the pin S to retain the same in that position. In place of a lip-rest for retaining the drill in proper position for grinding I provide an engaging-finger V, which is pivoted at *f'* toward the apex of the V-shaped holder G. This extends upwardly through a suitable longitudinal slot in the drill-holder and is held normally upward and yielding in position by the light spring *f*. A trigger V' extends below the drill-holder, so that the user can easily draw down this finger by pressing on the trigger. A cross-pin V'' is toward the upper end of the finger, a little back from the point. The point of this finger extends into the flute of the twist-drill or reaming-tool or engages the side of a flat drill when placed in the holder to prevent its rotation. The cross-pin V'' prevents its projecting too far into the flute. By placing the drill in position in this way it will be observed that the drills will take the proper position for grinding, as clearly appears in Fig. 12, which shows the position taken by twist-drills of different sizes, indicating the clearance for each size of drill when placed in the holder in this way as properly proportioned.

By adjusting the pivotal joint E' between the brackets E and F the angle of the drill-holder in relation to the face of the grinding-wheel can be varied to suit the requirements of the user. The pivot E' is exactly at the

apex of the drill-holder and affords a center of oscillation up and down for the drill-holder at that point, so that the proper relation of the point of the drill is always preserved no matter at what angle the drill-holder itself may be adjusted on this pivot.

Having thus described the various parts of my improved drill-grinding machine, I desire to state that it will be noted that in many particulars this structure is an improvement of the structure appearing in my former patent, No. 643,703, February 20, 1900. This device is adapted for use in grinding drills of size in which, owing to the intense heat developed, it is necessary to provide water on the grinding-surface. I also have provided the various parts adjustable, for reasons clearly appearing. I desire to state that the exact form in which I have shown these various parts is preferred by me. I am aware, however, that the form can be greatly varied and still contain the essence of my invention. To the skilled mechanic it will be obvious that certain features can be eliminated entirely or certain other features can be substituted for those I have shown. While I have shown a device for preventing the rotation of the drill and holder which possesses great merits in that it always positively adjusts the drill and at the same time permits the form of the front end of the drill-holder to be greatly varied without interfering with its operation, yet I am aware with the other features here shown that other forms of rests or stops might be utilized in place of the particular means shown. The advantages of the improved feature, however, would be wanting.

When grinding small drills which do not require the water, the pump, hood, and various parts might be omitted, and for grinding a single style, of course, the pivot connection at E' might be dispensed with.

It will be observed from the arrangement of the grinding-wheel and the drill-holder that when a small size of drill is placed within the holder it oscillates or turns on the axis of oscillation close to the face of the grinding-wheel and that when a larger size is introduced the axis is a little farther back from the point, thus properly increasing the radius of the curvature of the ground surface of the drill-lip, so that by this means the grinder automatically adjusts itself to any size drill which it is desired to grind.

It will be observed that the angle of the V-shaped drill-holder is acute, which facilitates the increasing of the radius of the drill-lip for the drills of larger size when placed in the drill-holder.

In mentioning the variations it is remarked that in place of a simple collar and the use of a small spring *n*, as appears in Fig. 3, this feature may be modified, as appears in Fig. 13, by putting a spring on the end of the stud C' and adjusting the tension on the same by a



suitable collar  $r$ , adjustable by spring  $r'$ . The spring can be omitted and other means be provided for keeping the holder in the proper position on the stud.

5 Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a drill-grinding machine, the combination of a suitable frame; a revoluble grinding-  
10 wheel; a suitable drill-holder positioned opposite the face of said grinding-wheel; a bracket to support said drill-holder having a pivotal support in a line transverse to and substantially opposite the apex of the holder whereby  
15 the drill can be ground to different angles, for the purpose specified.

2. In a grinding-machine, a suitable drill-holder, means for supporting the same, said means having a pivotal support substantially  
20 in line with the apex of said holder for the purpose specified.

3. In a grinding-machine, the combination of a grinding-wheel; a suitable holder, means for supporting the same, said means being  
25 pivotally adjustable substantially in a line transverse to the apex of the holder.

4. In a drill-grinding machine, the combination of a casing; a suitable revoluble grinding-wheel carried thereby; a V-shaped drill-  
30 holder; a bracket for supporting said holder having an adjustable pivotal support transverse to said drill-holder, and opposite the apex thereof, for the purpose specified.

5. In a drill-grinder, the combination of a  
35 suitable frame; a revoluble grinding-wheel thereon; a V-shaped drill-holder opposite the face of said grinding-wheel; a bracket having a transverse pivot which supports said drill-holder, the pivot being substantially in line  
40 with the apex of said holder; a supporting-bracket having an oblique journal supported in a suitable bearing, the axis of which, if extended, would form an acute angle with the face of the grinding-wheel, all coacting for  
45 the purpose specified.

6. In a drill-grinder, the combination of a suitable frame; a revoluble grinding-wheel supported thereon; a V-shaped drill-holder supported on an adjustable transverse pivot  
50 arranged at the apex thereof; a supporting-bracket having an oblique journal carried by a horizontally-adjustable bracket containing a suitable journal-bearing, coacting for the purpose specified.

55 7. In a drill-grinding machine, the combination of a suitable frame; a revoluble grinding-wheel thereon; a suitable drill-holder; an adjustable bracket C secured to said frame and having a stud C' thereon which carries the  
60 drill-holder whereby it may be raised or lowered for the purpose specified.

8. In a drill-grinding machine, the combination of a V-shaped holder G having a suitable adjustable tail-block; and a rest for the drill  
65 arranged within the holder consisting of the finger V extending through the slot at the

forward end, pivoted at F' beneath the drill-holder and adapted to project upwardly in a central position; a spring to hold the same  
70 yieldingly in the upward position, and a cross-pin V'' near the upper end to prevent the rest extending too far into the flute of the drill, for the purpose specified.

9. In a drill-grinding machine a V-shaped holder having a drill-rest arranged to project  
75 up from the bottom of said groove; means to hold the same yieldingly in position whereby it will adapt itself to different sizes of drills when they are placed upon the same and pressed down into the holder. 80

10. In a drill-grinding machine the combination of a grooved drill-holder with a drill-rest projecting upwardly from the bottom of the groove and adapted to engage the flutes of the drill and supported yieldingly in position whereby when different sizes of drills are  
85 placed in the holder the said rest will be depressed whereby the said holder will be adapted to any size of drill within its scope, for the purpose specified. 90

11. In a drill-grinding machine the combination of a grooved drill-holder with a rest adapted to move upwardly from the bottom of the groove to engage the flutes of different sizes of drills when placed within the holder, 95 as specified.

12. In a drill-grinder, the combination of a V-shaped holder G; a drill-rest V arranged in a slot in the bottom thereof and supported by a pivot F'; a trigger V' to the under side  
100 of the same for depressing it in the holder; a spring to hold the same normally into the holder; and a cross-pin V'' at the upper end of the drill-rest, for the purpose specified.

13. In a drill-grinder, the combination of a  
105 V-shaped holder G; a drill-rest V arranged in a slot in the bottom thereof and supported by a pivot F'; a trigger V' to the under side of the same for depressing it in the holder; and a spring to hold the same normally into  
110 the holder, for the purpose specified.

14. In a drill-grinding machine the combination of a V-shaped holder; a yielding drill-stop in the bottom thereof; a clamp pivoted to the holder and adapted to press upon the  
115 drill to hold it down into the holder and against the drill-rest within the same, for the purpose specified.

15. In a drill-grinding machine the combination of a V-shaped holder with yielding  
120 drill-stop in the bottom thereof for the purpose specified.

16. In a drill-grinding machine, the combination of a V-shaped holder; a clamp for retaining the drill in the holder, consisting of  
125 an arm P, having a cross-arm P' pivoted to one side of said holder; a spring T to hold the same into contact with the drill in the holder; and a hook U to engage the clamp when the holder is open, for the purpose specified. 130

17. In a drill-grinding machine, the combi-



nation of a V-shaped holder; a clamp for retaining the drill in the holder, consisting of an arm P having a cross-arm P' pivoted to one side of said holder; a spring T to hold the  
5 same into contact with the drill in the holder, for the purpose specified.

In witness whereof I have hereunto set my

hand and seal in the presence of two witnesses.

HENRY P. WHITE. [L. S.]

Witnesses:

S. A. EARL,

OTIS A. EARL.