

(No Model.)

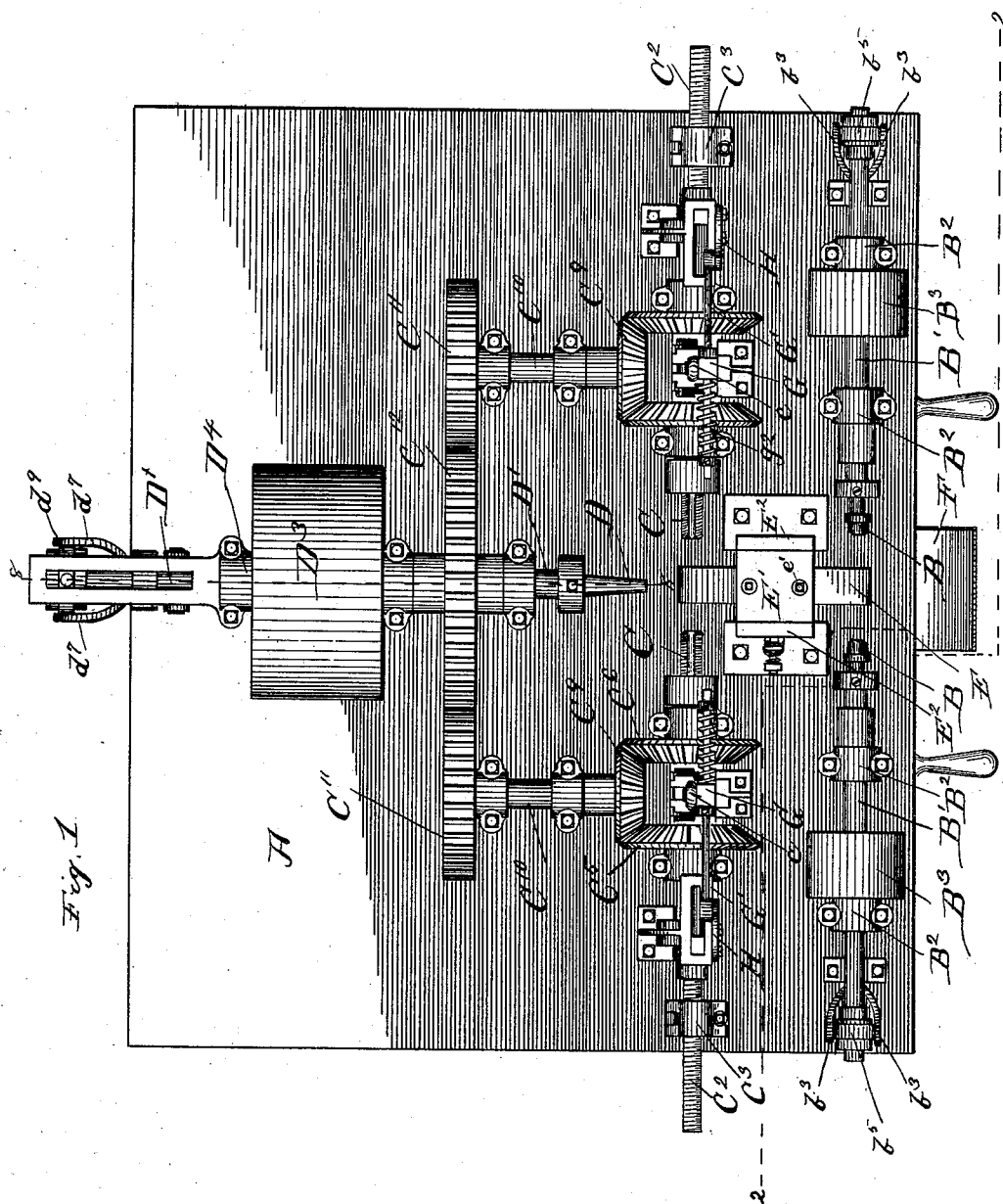
4 Sheets—Sheet 1..

J. GIELOW.

BORING AND TAPPING MACHINE.

No. 376,032.

Patented Jan. 3, 1888.



Witnesses:
 Lew. C. Curtis.
 J. M. Sunday.

Inventor:

John Gielow.

By Munday, Everts and Atchey
his Attorneys:

(No Model.)

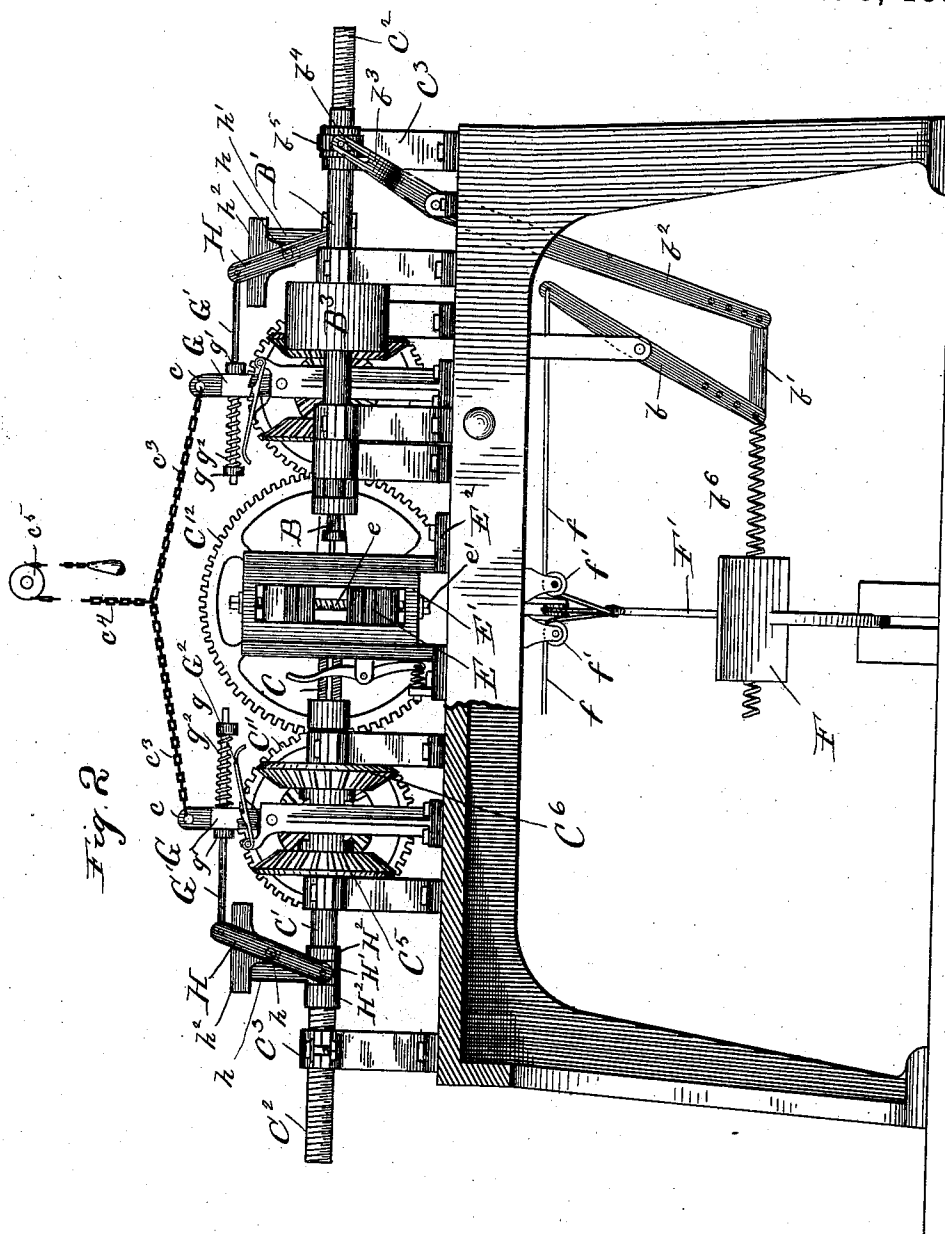
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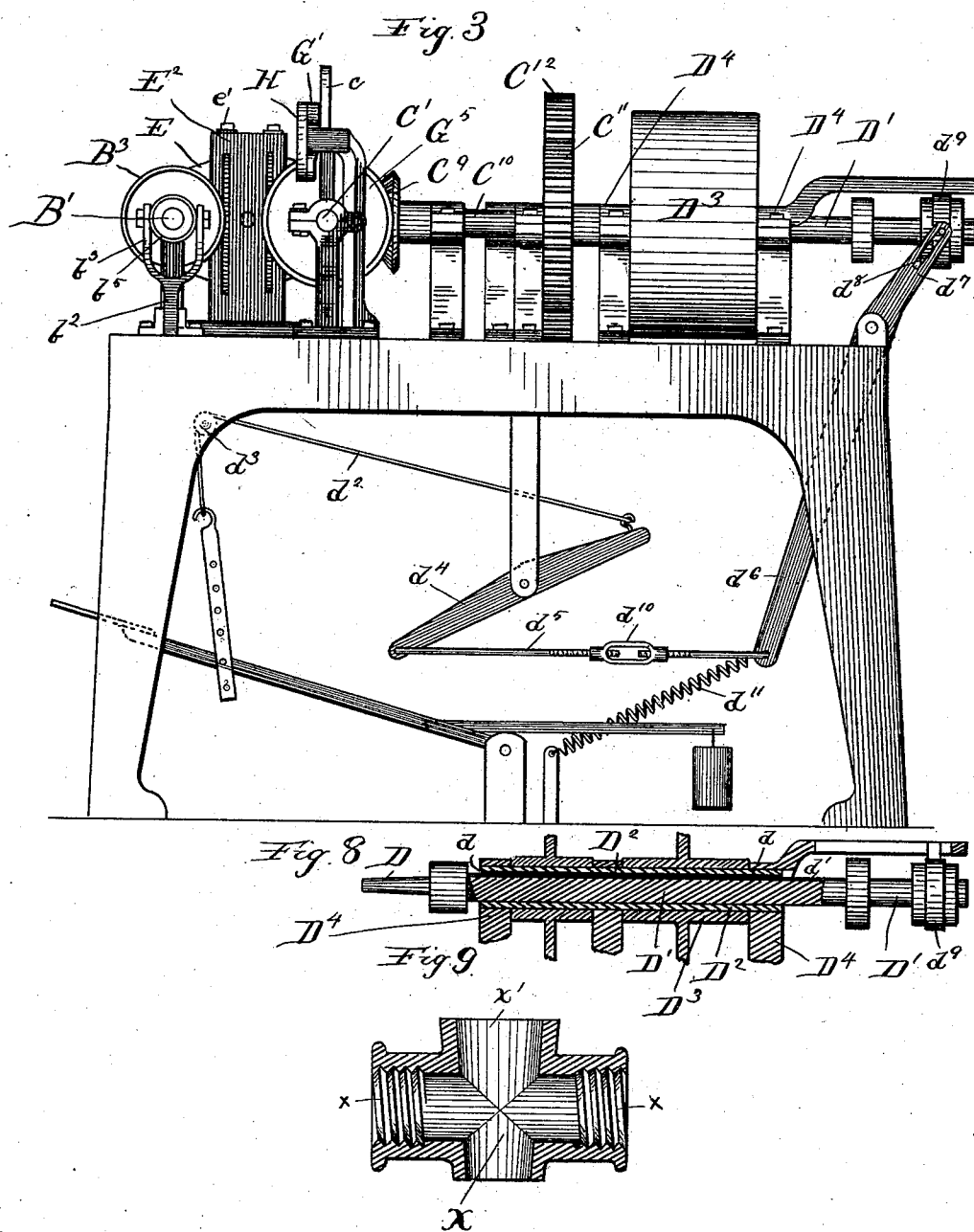
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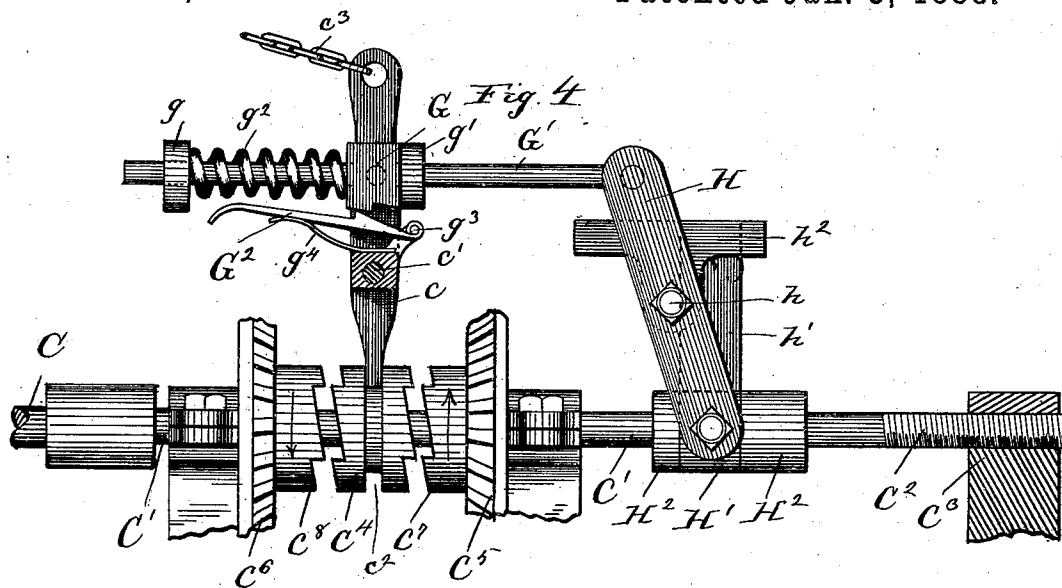
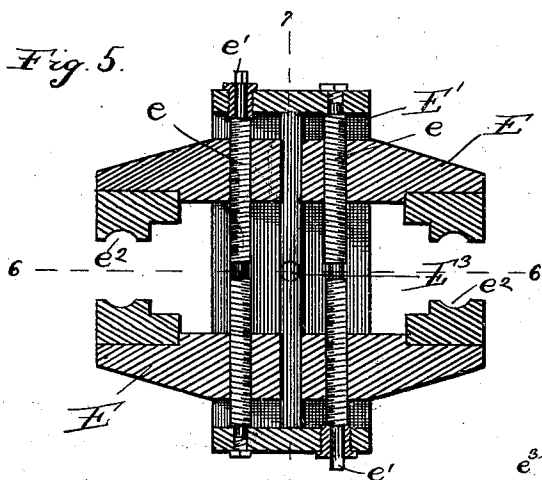
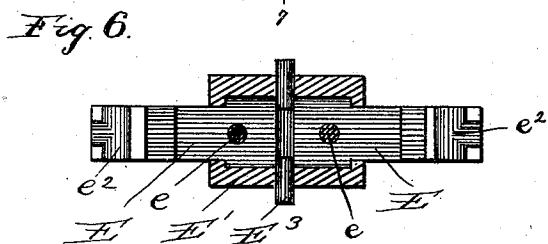
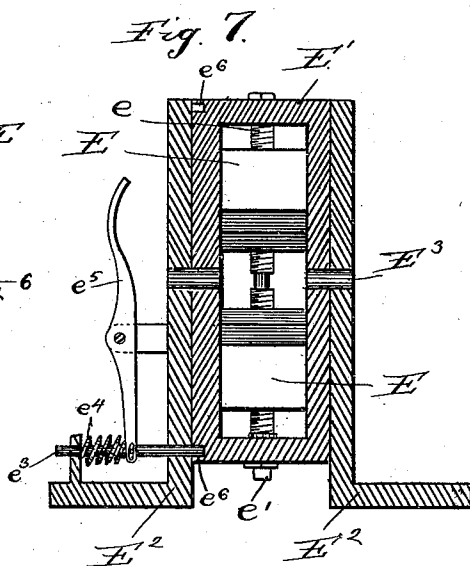
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UNITED STATES PATENT OFFICE.

JOHN GIELOW, OF CHICAGO, ILLINOIS.

BORING AND TAPPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 376,032, dated January 3, 1888.

Application filed July 5, 1887. Serial No. 243,365. (No model.)

To all whom it may concern:

Be it known that I, JOHN GIELOW, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Boring and Tapping Machines, of which the following is a specification.

My invention relates to machines for boring and tapping cocks, valves, and other articles used in plumbing or in gas or steam fitting, and having several branches or ends to be bored or bored and tapped.

Heretofore the several branches or limbs of the cock, valve-case, or other article have been bored and tapped separately or one at a time, the cock or valve being turned in or removed from its clamp after each operation.

It is the object of my invention to provide a machine whereby a cock, valve, or other brass article having two or more ends or branches may be finished, all its branches bored or bored and tapped, as required, without removing it from its clamp or holder, and whereby the several operations of boring and tapping the several branches of the cock or valve may be all done at the same time, and thus materially increase the capacity of the machine and diminish the cost of manufacturing such articles.

To this end my invention consists in a rotatable clamp holder or frame having two clamps mounted thereon for simultaneously clamping or holding two articles, in combination with a pair of boring-tools for boring the two opposite ends of the article, and a transverse boring-tool for boring out the valve-seat or transverse hole in the cock or article, said boring-tools operating simultaneously.

It further consists in connection with such rotatable clamp-holder and its clamps and the two boring-tools of a pair of tapping-tools operating simultaneously therewith, said tapping-tools operating upon the cock or valve shell held in one of the clamps after it has been operated upon by said boring-tools and while said boring-tools operate upon the cock or valve held in the other clamp, the two boring-tools serving to prepare the cock or valve for the two tapping-tools, and the rotatable clamp-holder serving to carry the cock, valve, or other article from the boring-tools to the tapping-tools.

It further consists in the novel devices and novel combinations of devices herein shown and described, and more particularly pointed out in the claims.

In the accompanying drawings, which form a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is a plan view of a machine embodying my invention. Fig. 2 is a front view, partly in section, looking from the line 2 2 of Fig. 1. Fig. 3 is an end view. Fig. 4 is an enlarged detail view of the clutch and clutch-operating mechanism of one of the tapping-tools. Fig. 5 is a section on line 5 5 of Fig. 1. Fig. 6 is a section taken on line 6 6 of Fig. 5. Fig. 7 is a section taken on line 7 7 of Fig. 5. Fig. 8 is a section on line 8 8 of Fig. 1, and Fig. 9 is a sectional view of one of the cocks or valve-shells which the machine is designed to bore and tap.

In the drawings, A represents the frame of the machine.

B B are the simultaneously-movable opposite boring-tools which serve to bore out the opposite ends, *x x*, of the cock or other article, X.

C C are the two opposite tapping or threading tools which serve to tap the opposite ends of the cock after the same have been bored by the tools B B.

D is the boring-tool, which bores out the conical hole or seat *x'* of the cock or valve. The tapping-tools C C are arranged parallel to the boring-tools B B, and the boring-tool D is arranged transversely—that is to say, the tools B B and C C are arranged axially with the branches *x x* of the article when the article is presented before such tools by the chucks or clamps E E in the clamp-holder or frame E', and the tool D is arranged axially with the branch *x'* of the article. The two jaws of each of the clamps E E are mounted in the rotatable clamp holder or frame E', and are closed or opened by means of a screw, *e*, having right and left hand threads. The screws *e e* are each provided with a squared end, *e'*, to receive a wrench to operate or turn them by. Each jaw of each of the clamps E E is furnished with a socket or recess, *e'*, corresponding with the valve-shells to be clamped therein, as indicated in Figs. 5 and 6. The clamp-holder or frame E' is mounted upon a pair of brackets

or standards, $E^2 E^2$, attached to the frame of the machine. A clutch-pin, e^3 , furnished with a spring, e^4 , and operating-lever e^5 , engages the recesses $e^6 e^6$ in the clamp-holder E' and serves to hold the same in position and to center the articles held in the clamps with the tools $B B$, $C C$, and D . The clamp-holder E' is rotated upon its shaft or pivot E^3 by hand, the registering-pin e^3 being first withdrawn. The spindles $B' B'$ of the boring-tools $B B$ are journaled in suitable bearings, $B^2 B^2$, on the frame of the machine, and are adapted to slide longitudinally or reciprocate in such bearings. The boring-tools $B B$ or their spindles $B' B'$ are simultaneously moved or pressed forward against their work by means of a foot-lever, F , connected by the adjustable link F' and the cords or chains f , running over pulleys f' , with the levers b , which are connected by the links b' with the levers b^2 . The upper ends of the levers b^2 have forks or yokes $b^3 b^3$, furnished with slots b^4 , through which said levers are pivotally connected with the loose collars $b^5 b^5$ on the spindles $B' B'$.

$B^3 B^3$ are the pulleys on the spindles $B' B'$ for revolving the same. Springs $b^6 b^6$ serve to retract the spindles $B' B'$ when the foot is removed from the treadle. The spindle D' of the valve-seat boring-tool D reciprocates through the hollow driving-shaft D^2 . The hollow shaft D^2 and spindle D' are made to revolve together by a key or spline, d , on the shaft, which fits in a corresponding groove, d' , in the spindle D' , so as to permit the spindle to reciprocate in the hollow shaft. The shaft D^2 is driven through a pulley, D^3 , thereon, and it is journaled in suitable bearings, D^4 , on the frame of the machine. The spindle D' is fed or pressed forward as it revolves simultaneously with the forward movement of the spindles $B' B'$ by means of the same treadle or foot lever F .

The connecting mechanism between the operating-lever F and the spindle D' may be of any suitable kind; but it may preferably be like that before described for communicating motion to the spindles $B' B'$ —that is to say, it may preferably consist of a line, d^2 , pulley d^3 , lever d^4 , link d^5 , and lever d^6 , having fork d^7 , with slots d^8 , pivoted to loose collar d^9 on the spindle D' . The connecting-link d^5 , between the levers d^4 and d^6 , is furnished with an ordinary turn-buckle, d^{10} , for adjusting the movement of the spindle D' in relation to that of the spindles $B' B'$. In like manner the levers b and b^2 are furnished with a number of different holes for the pivotal links b' , as indicated in Fig. 2. The spindle D' is retracted by means of a spring, d^{11} . The shafts or spindles $C' C'$ of the tapping or threading tools $C C$ are furnished with screws $C^2 C^2$, which turn in fixed nuts or threaded bearings $C^3 C^3$, secured to the frame of the machine. These spindles are further provided with double clutches $C^4 C^4$, suitably splined on said shaft, so that they may slide thereon while revolving with it.

The spindles $C' C'$ are each driven first in one direction to cut the screw-threads in the valve and then in the opposite direction to unscrew or withdraw the tool from the valve by means of a pair of oppositely-driven loose gears, $C^5 C^5$, on the shaft C' , having clutch-faces $C^7 C^7$, with which the double clutch C^4 alternately engages. The bevel-gears $C^5 C^6$ of each spindle C' are driven in opposite directions by a bevel-gear, C^9 , on the shaft C^{10} , on which shaft is also a spur-gear, C^{11} , which meshes with a gear, C^{12} , on the hollow driving-shaft D^2 of the boring-tool D .

The sliding clutches C^4 are operated by levers $c c$, pivoted at $c' c'$ to the frame of the machine or to suitable standards thereon. The lower ends of the levers $c c$ fit in circular grooves $c^2 c^2$ cut in the clutches $C^4 C^4$, and the levers are pulled simultaneously through cords or chains $c^3 c^3$, which are connected to the common chain c^4 , that extends up over the pulley c^5 and down into convenient reach of the operator. The movements thus given simultaneously to the clutches $C^4 C^4$ by the operator causes said clutches to engage the clutch-faces of the gears $C^5 C^5$, and thus to rotate the spindles $C' C'$ in the direction necessary to cut the threads in the opposite ends of the cock or valve shell. To each of the levers c is pivoted a ratchet-block, G , through a suitable hole in which the operating-rod G' passes. The rod G' is furnished with collars or shoulders $g g'$ and a coil-spring, g^2 . One end of the rod G' is pivotally connected to the lever H , which is pivoted at h to the frame of the machine and at its lower end to a loose collar, H' , on the spindle or shaft C' . The collar H' is provided with an arm or projection, h' , which travels back and forth in a suitable guide, h^2 , and thus holds the collar in position or from revolving, as well as the mechanism connected to said collar. The collar H' is prevented from sliding on the shaft C' by the fixed collars $H^2 H^2$.

When the operator pulls the levers $c c$ so as to throw the clutches $C^4 C^4$ into engagement with the clutch-faces of the gears $C^5 C^5$, the levers $c c$ are held in this position by pawls G^2 , pivoted to the frame at g^3 , and furnished with springs g^4 . As the tapping operation proceeds and the spindle C' is moved forward by the thread or feed screw C^2 , the lever H draws the sliding rod G' farther and farther through the ratchet-block G , pivoted to the clutch-lever c , thus compressing the spring g^2 . When the tapping or threading operation is completed, the fixed collar g , on the rod G' , or other suitable cam or projection on said rod, strikes against the end of the pivoted pawl G^2 and depresses it, thus releasing the ratchet-block G from the pawl and permitting the spring g^2 to move the clutch-lever c to the other side and throw the clutch C^4 into engagement with the clutch-face of the reversing-gear C^6 , and thereby unscrew the tapping-tool C from the valve. As the unthreading proceeds the

spindle or shaft C' will move back, and thus push the rod G' in the opposite direction until the collar g' strikes against the block G, and thus withdraws the clutch C' from engagement with the reversing-gear C⁵. As soon as the clutch C' is disengaged from the gear C⁵ the shaft C' will cease to rotate, and the clutch will thus be held by the lever c, rod G', and lever H in its middle position and out of engagement with both gears C⁵ and C⁶, as shown in Fig. 4, until the operator again moves the lever c.

The machine shown in the drawings is designed to operate upon cocks of the form shown in Fig. 9 of the drawings, and in which there are three branches, x, x, and x', the branches x x being arranged directly opposite or at an angle of one hundred and eighty degrees to each other and the branch x' at right angles to the branches x x. The clamps shown and described are therefore of this same form, and the two boring-tools B B are accordingly arranged in like manner, or at an angle of one hundred and eighty degrees to each other, and the tool D at an angle of ninety degrees to the tools B B, and the tools C C parallel to the tools B B. It will, however, be understood that where the branches of the valve or other article to be operated upon stand at different angles to each other the tools will likewise be arranged at different angles to each other to correspond—that is, so that the tools will stand axially with the branches to be operated upon by them. The clamps E E are preferably arranged diametrically opposite to each other in respect to the axis of rotation of the clamp-holder E', in which case of course the boring-tools B B and tapping-tools C C, to enable them to co-operate with such rotatable clamp-holder, are also arranged diametrically opposite to each other in respect to the axis of the clamp-holder E'. The clamps E E may, however, be differently located on the holder or frame E', if desired, the tools B and C being correspondingly arranged.

In operation, a valve-case, cock, or other article is first placed in one of the clamps E, the treadle F depressed by the foot, and the bearing-tools B B thus brought into operation, and the two ends x x of the articles bored preparatory to being tapped. The clamp-holder E' is then turned half around on its axis, thus bringing the first valve into position before the tapping-tools C C and the valve-seat boring-tool D. The cord c⁴ is then pulled by the operator and the tapping-tools C C set in operation. While the tapping-tools are doing their work and withdrawing themselves from the first article the operator puts another article in the other clamp, and then, by pressing down the foot-lever F simultaneously, forces forward into operation the boring-tools B B on the second article and the boring-tool D on the first article. By the time the boring of the two articles or valves is thus completed the threading-tools C C will have completed their operation and been withdrawn from the valve

or article. The clamp-holder E' is then again turned half around and the first article removed from the clamp and a third put in its place, 70 and so on.

By use of my machine one man is enabled to bore and tap about three times as many cocks or other articles, having two or more branches to be bored or tapped, per day as he could do 75 by the machines heretofore in use.

I claim—

1. The combination, in a boring and tapping machine, of a rotatable clamp-holder, E', furnished with clamps E E, of boring-tools B B 80 and D, tapping-tools C C, the boring-tools B B operating upon an article held in one of said clamps, while the tapping-tools C C and boring-tool D operate upon an article held in the other clamp, substantially as specified. 85

2. The combination, with a rotatable clamp-holder and clamps mounted thereon, of a boring-tool and a tapping-tool adapted to operate simultaneously, said boring-tool operating upon an article held in one of said clamps, 90 while said tapping-tool operates upon the article held in the other of said clamps, the axis of said clamp-holder being between said boring and tapping tools, substantially as specified.

3. The combination, with a rotatable clamp-holder and two clamps or chucks mounted thereon, of tools B B D, their operating spindles B' B' D', and mechanism for simultaneously operating said spindles, said tools B B operating upon an article held in one of said 100 clamps, while said tool D operates upon an article held in the other of said clamps, the axis of said revolving clamp-holder being between said tools D and B B, and the spindle D' being transverse to the spindles B' B', substantially as specified. 105

4. The combination of the standard or frame E², with a revoluble clamp-holder, E', and clamps E E mounted thereon, and provided with registering notches e⁶, a registering clutch 110 or pin, e⁷, and a pair of revolving spindles or shafts carrying tools at their adjacent ends, between which said revoluble clamp-holder is mounted, substantially as specified.

5. The combination, with a revoluble clamp 115 holder or frame and clamps mounted thereon, of a pair of revolving spindles or shafts carrying tools at their adjacent ends, between which said revoluble clamp-holder is mounted, operating-lever F, lines f, pulleys f', levers b, 120 links b', levers b², and collars b⁵ on said spindles, substantially as specified.

6. The combination, with a clamp or chuck of a pair of tapping-tools, C C, carried on shafts C' C', furnished with feed-screws, of a 125 pair of double clutches, C' C', and clutch-levers c c, and a chain or equivalent device connecting said clutch-levers together for simultaneous operation, substantially as specified.

7. The combination, with a clamp or chuck 130 of a pair of tapping-tools, their spindles, feed-screws, and driving and reversing gears, of a pair of clutches, as C' C', clutch-levers c c, chains or equivalent devices for simultane-

- ously moving the clutches to engage the driving-gears, springs for moving the clutch-levers in the opposite direction, pawls and ratchets to hold the clutches in engagement with the gears, and collars or projections on said spindles, adapted to engage said pawls and release the clutch-levers when the tapping operations are finished, and thus reverse the motion of the spindles, substantially as specified.
- 10 8. The combination, with a clamp or chuck of a pair of tapping tools, their spindles, feed-screws, and driving and reversing gears, of a pair of clutches, as C¹ C¹, clutch-levers c c, chains or equivalent devices for simultane-
- 15 ously moving the clutches to engage the driving-gears, springs for moving the clutch-levers in the opposite direction, pawls and ratchets to hold the clutches in engagement with the gears, and collars or projections on said spindles, adapted to engage said pawls and release the clutch-levers when the tapping operations are finished, and thus reverse the motion of the spindles, and levers and connecting rods operated by said spindles for moving the
- 20 clutch-levers and disengaging the clutches from the reversing-gears, substantially as specified.
- 25 9. The combination, with a pair of tapping-tools, their shafts or spindles, feed threads or

screws, driving and reversing gears, of clutches 30 C¹ C¹, clutch-levers c c, ratchet-blocks G G, pivoted to said clutch-levers, sliding rods G' G', pawls G² G², levers H H, springs g² g², said spindles being provided with collars or projections to operate said jaws, substantially as 35 specified.

10. The combination, with a revolving spindle, C', carrying a tool, and furnished with feed-screws C², and driving and reversing gears C³ C³, furnished with clutches C⁷ C⁸, of double 40 clutch C⁴, clutch-lever c, ratchet-block G, sliding rod G', pawl G², lever H, spring g², and collar or projection g on said spindle for moving said pawl, substantially as specified.

11. The combination, with a revolving spin- 45 dle, C', carrying a tool and furnished with feed-screws C², and driving and reversing gears C³ C³, furnished with clutches C⁷ C⁸, of double clutch C⁴, clutch-lever c, ratchet-block G, sliding rod G', pawl G², lever H, loose collar H' 50 on said spindle, having arm h and guide h' for said arm, spring g², and collar or projection g on said spindle for moving said pawl, substantially as specified.

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