(No Model.) 4 Sheets—Sheet 1.

J. E. HOWARD.

MANUFACTURE OF CORKS BY GRINDING AND MACHINERY FOR THE PURPOSE.

No. 510,539. Patented Dec. 12, 1893.

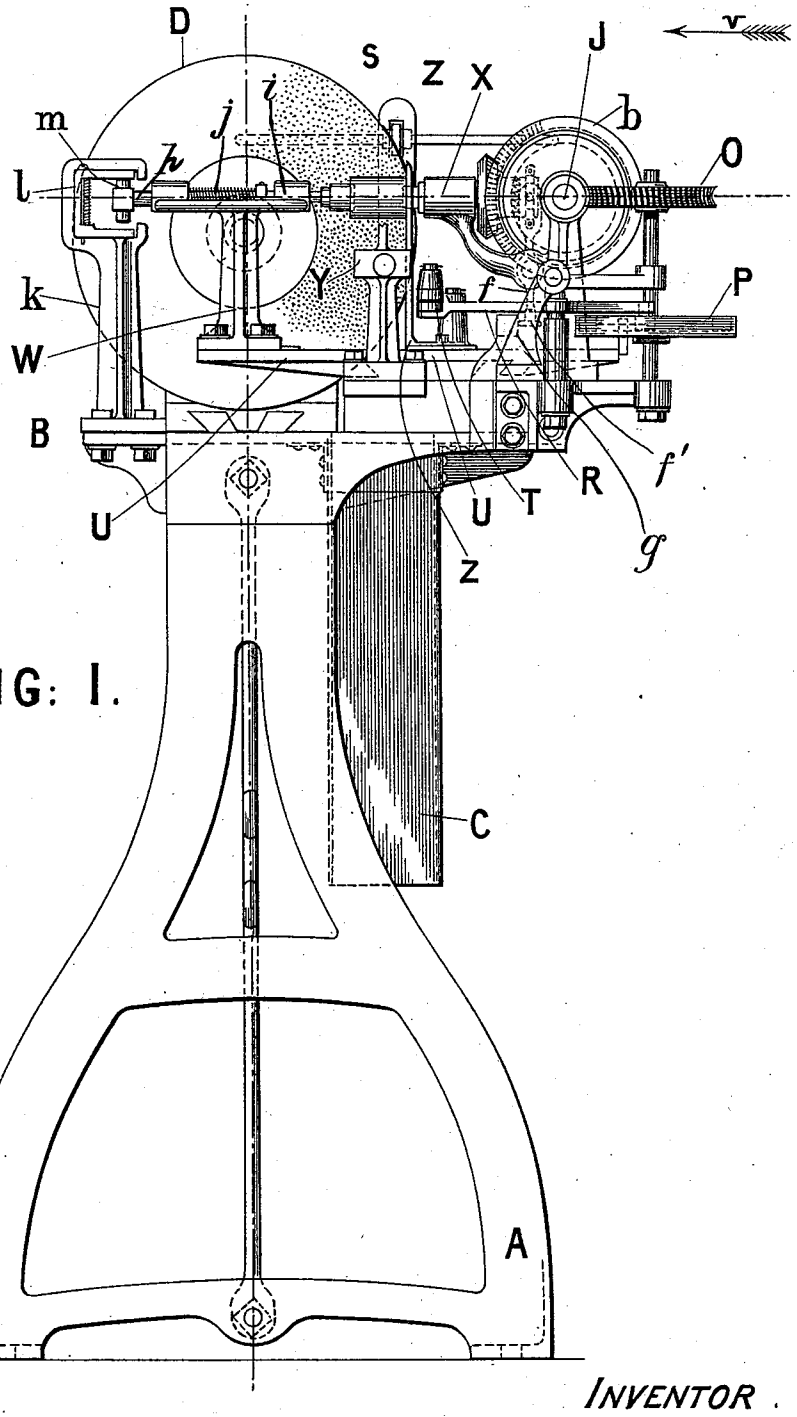


FIG: I.

WITNESSES.

John A. Thiele

W. H. Dwight.

INVENTOR.

John E. Howard,

by Whitman & Wilkinson.

Attys

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 2.

J. E. HOWARD.

MANUFACTURE OF CORKS BY GRINDING AND MACHINERY FOR THE PURPOSE.

No. 510,539. Patented Dec. 12, 1893.

FIG. 2.

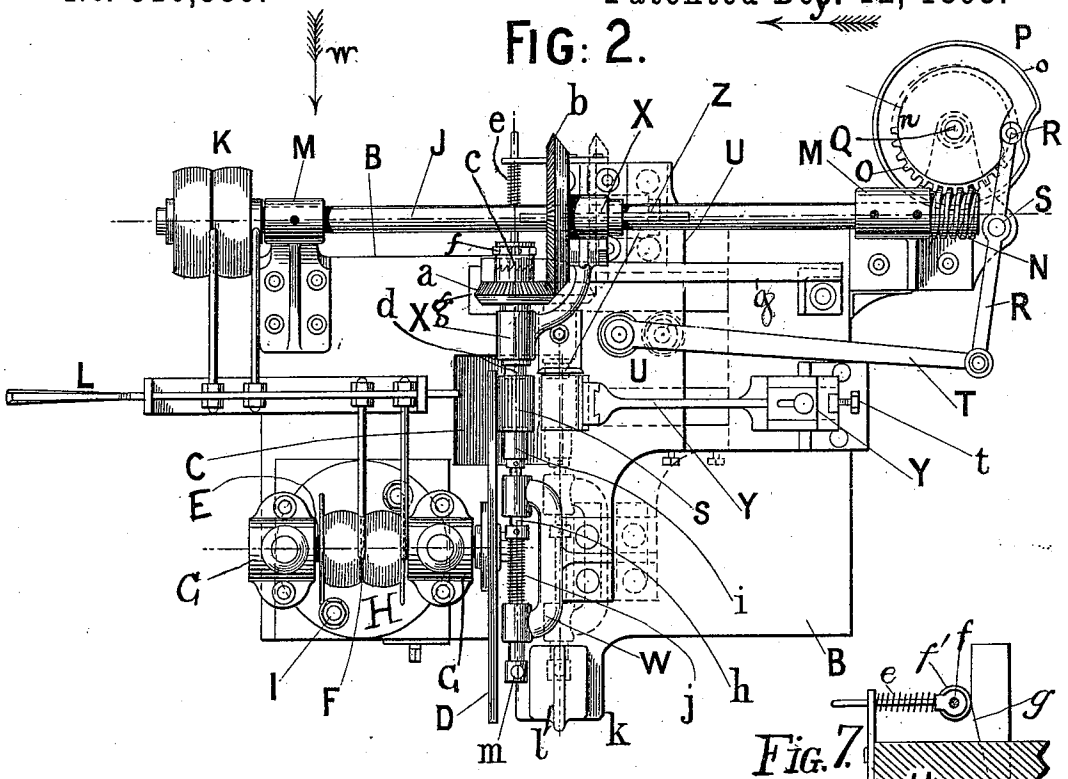


FIG. 7.

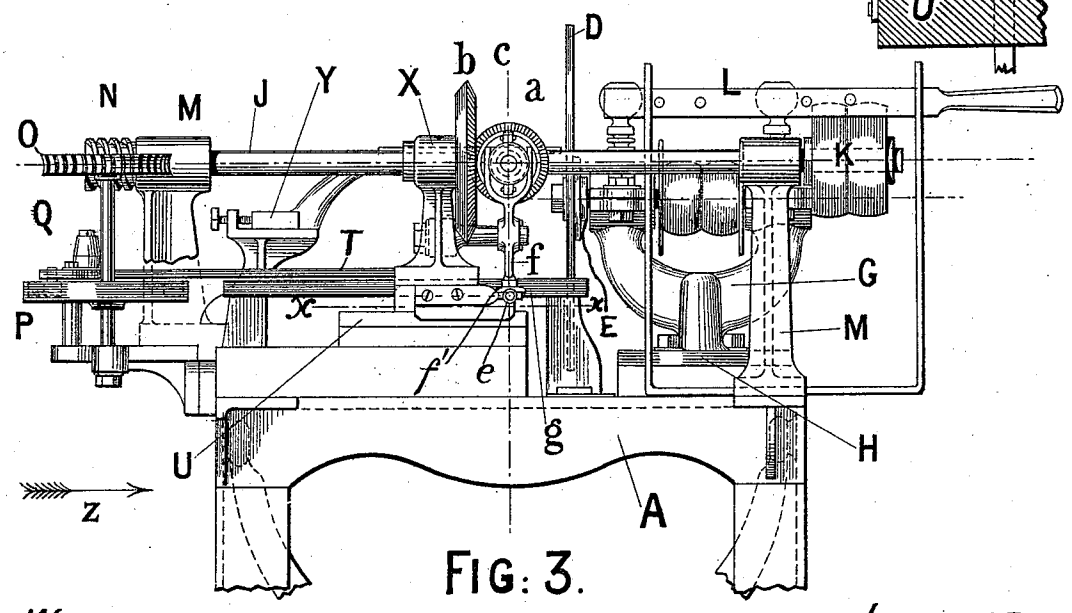


FIG. 3.

WITNESSES.

John A. Wilkinson

Wm. H. Dwight.

INVENTOR.

John E. Howard,

by Whitman & Wilkinson

Atty's.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 3.

J. E. HOWARD.

MANUFACTURE OF CORKS BY GRINDING AND MACHINERY FOR THE PURPOSE.

No. 510,539. Patented Dec. 12, 1893.

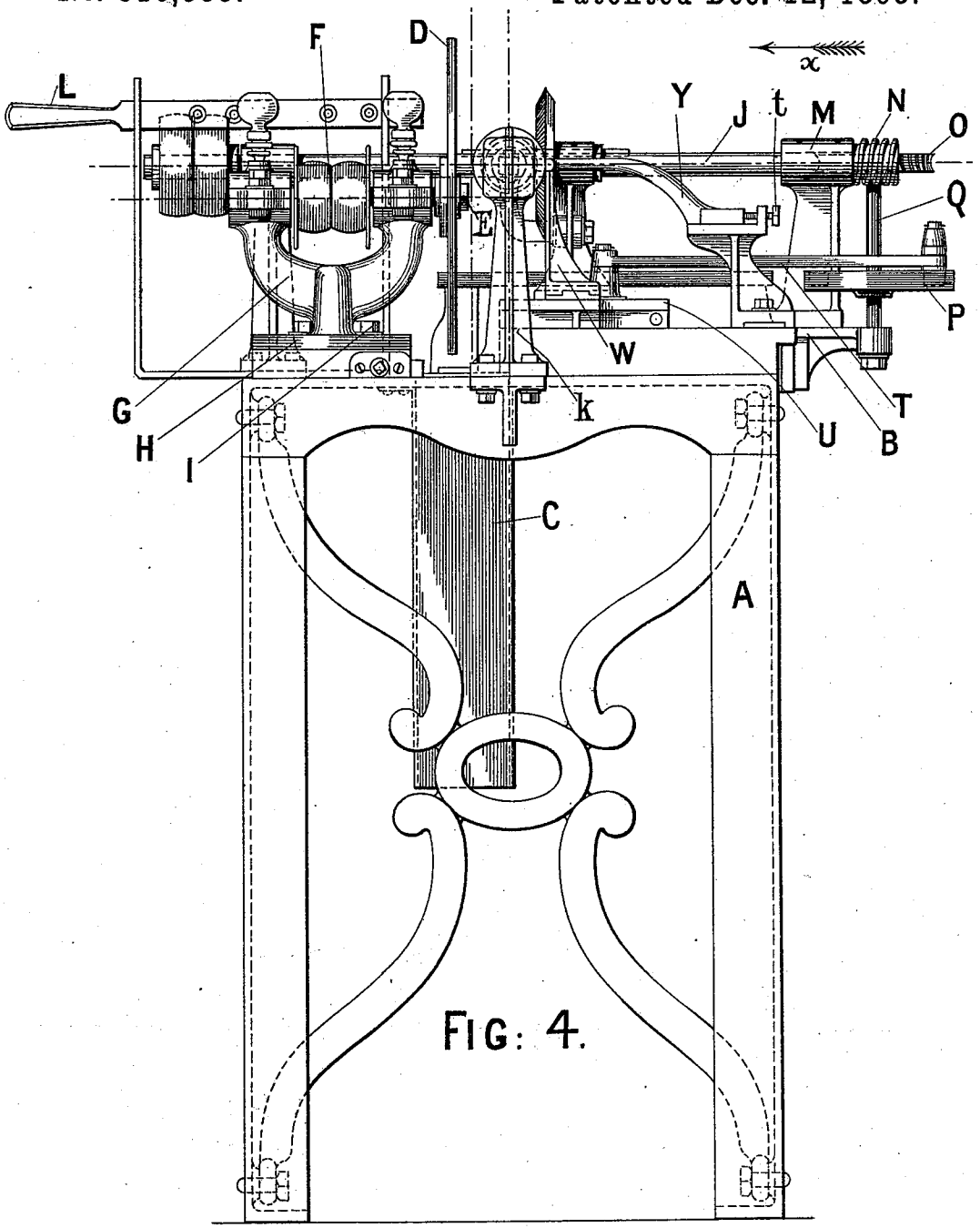


FIG. 4.

WITNESSES.
John C. Wilson
M. H. Quigg.

INVENTOR
John E. Howard,
by Whitman & Wilkinson
Attys.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 4.

J. E. HOWARD.

MANUFACTURE OF CORKS BY GRINDING AND MACHINERY FOR THE PURPOSE.

No. 510,539. Patented Dec. 12, 1893.

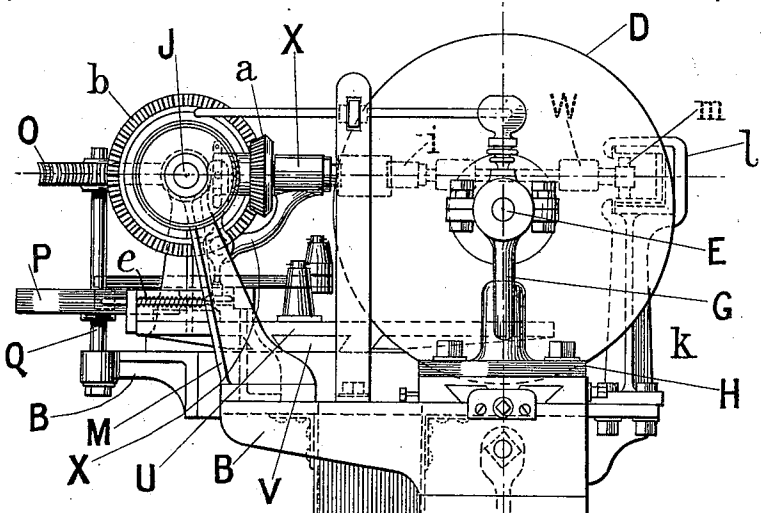


FIG: 5.

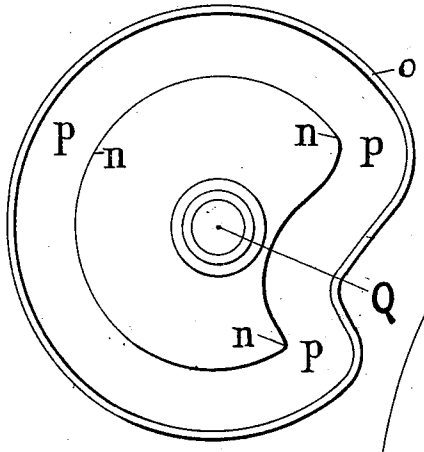
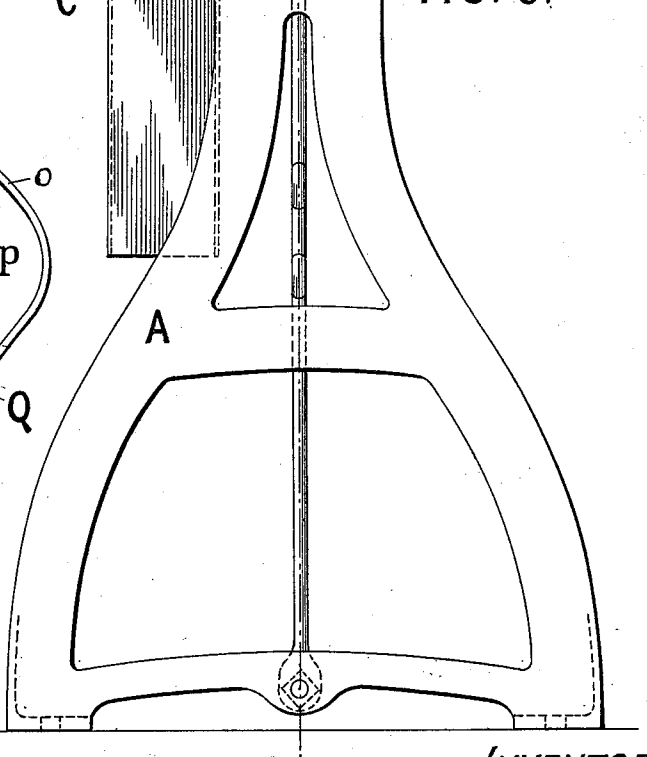


FIG: 6



WITNESSES.
John A. Wilson.
W. H. Duggs.

INVENTOR
John E. Howard
by
Whitman & Wilkinson
Atty's.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN EISENHARDT HOWARD, OF LONDON, ENGLAND.

MANUFACTURE OF CORKS BY GRINDING AND MACHINERY FOR THE PURPOSE.

SPECIFICATION forming part of Letters Patent No. 510,539, dated December 12, 1893.

Application filed January 18, 1893. Serial No. 458,843. (No model.) Patented in England February 17, 1892, No. 3,137.

To all whom it may concern:

Be it known that I, JOHN EISENHARDT HOWARD, manufacturer, a subject of the Queen of Great Britain, residing at 73 Minories, London, England, have invented Improvements in the Manufacture of Corks by Grinding and in Machinery for the Purpose, (for which I have made application for patent in Great Britain, No. 3,137, dated February 17, 1892,) of which the following is a specification.

This invention relates to grinding "squares" or "quarters" of cork into shape (*i. e.*, round or approximately round) entirely and automatically by mechanical means. And in order that my present invention may be easily understood and readily carried into practice I will proceed to fully describe same with reference to the drawings hereunto annexed.

Figure 1 is an end elevation facing the abrading surface of the grinding disk—*i. e.*, looking in the direction of the arrows *x*, *y* and *z*. Fig. 2 is a plan of the machine. Fig. 3 is a side view of the machine looking in the direction of the arrows *v* and *w*. Fig. 4 is a view of the opposite side of the machine to Fig. 3. Fig. 5 is a view of the opposite end of the machine to Fig. 1—*i. e.* looking in the opposite direction to the arrows *x*, *y* and *z*. Fig. 6 shows a plan of the slide actuating cam (hereinafter particularly described) detached from the machine. Fig. 7 represents an inverted view of a section along the line X X of Fig. 3.

Similar letters of reference indicate corresponding parts throughout.

A is a frame or standard.

B is a bed or platform carried on A.

C is a chute or spout down which the finished corks are dropped.

D is an abrading disk.

E is an axle keyed or fixed to D and by means of which the latter is revolved.

F represents fast and loose pulleys on axle E.

G represents forked bearings in which is journaled the axle E.

H is a turntable foundation to forked bearings, capable of swivel movement on table B so as to adjust disk D at any angle desired—to form taper corks.

I represents screw bolts for clamping H in desired position.

J is a cam actuating shaft and shaft from which the cork gripping chucks are revolved.

K represents fast and loose pulleys on shaft J.

L is a driving belt operating device to throw the driving belt simultaneously on or off the driving pulley of both F and K.

M represents supports fixed to B in which the shaft J is journaled.

N is a worm on shaft J.

O is a worm wheel on cam shaft Q.

P is a cam (shown in detail in Fig. 6) for giving requisite motion to the "slide" U—which latter carries the mechanism for seizing and presenting the cork block to be ground against the abrading disk D.

R is a rocking arm pivoted at S—one end of which is controlled by the cam P and the other end pivoted to the slide actuating rod T.

T is a slide actuating rod.

U is a "slide" which travels in guides or on a V-shaped or dovetail guide bar or rail V fixed or formed on the bed or plate B.

W is a support fixed and carried on slide U for the cork gripping chuck having movement imparted thereto in the direction of its axis so as to drop the ground cork and snap hold of the next piece to be ground.

X is a support carried on slide U for second cork gripping chuck and clutch in connection therewith (which latter has a very quick rotatory movement imparted thereto intermittently, viz: Just as the slide U has moved the two said chucks close up to the face of the abrading disk D) and said support X carries the bevel cog wheels *a* and *b* the latter of which slides on a "feather" on the shaft J.

Y is the rest or device carrying the feed table upon which each block of cork to be ground is laid by hand ready to be seized hold of by the aforesaid chucks.

Z is an adjustable gage fixed on and moved by the slide U so as to insure each cork block being correctly placed in proper position on the aforesaid feed table.

a is a bevel cog wheel having a hollow axle thereto (constantly revolved by the bevel wheel *b*) and rotating also one part of the clutch. See Fig. 2.

b is a bevel cog wheel rotated by shaft J but

free to travel along said shaft J on a "feather" thereon—both cog wheels *a* and *b* being carried in and by the support X on the slide U.

d is the rotated chuck (carried by support X) the axle of this chuck passing through the hollow spindle of cog wheel *a* and having the counter part *c* of the clutch mounted (either fixed or on a "feather") thereon—but normally this part *c* of the clutch is kept back out of contact by the spring *e*.

f is a rocking arm pivoted to support X (see Fig. 3) and at its upper and forked end embraces the clutch part *c* and at its lower end has a wheel *f'* therein riding up the inclined surface *g* fixed to the bed B so as thus to throw the clutch into action and revolve the chuck *d* as the latter approaches the abrading disk D—and when the slide U is drawn back from disk D the lower end of arm *f* rides down the incline *g* the clutch *c* is drawn out of gear and the chuck *d* ceases revolving until the next approach to the disk D.

h is the spindle of the second or "snapping" chuck *i* which is journaled in the forked bearings formed by W and this chuck *i* is kept normally pressed toward the rotated chuck *d* by spring *j* Fig. 2.

k is an upright or support fixed on platform B and has an inclined surface (not shown) in the head *l* thereof interposed across the path of travel backward of the cross pin or roller *m* on the spindle *h* so that immediately the slide U begins to move away from the disk D the pin *m* begins to ride up the said inclined surface and so the spindle *h* and chuck *i* are drawn backward away from chuck *d* and the ground cork drops out from between the chucks *d* and *i* and falls down the chute C.

Meanwhile the slide U continues to travel backward until just as it reaches its limit of travel backward the pin *m* comes off the end of the incline (not shown) and is free and the spring *j* then instantly snaps the chuck *i* toward chuck *d* and thus grips the next block of cork resting ready on the feed table Y, as indicated in dotted lines in Fig. 2. The free end *i. e.* the bottom of the incline is (by a spring) kept pressed across the path of forward travel of the pin *m* so that as same advances toward the disk D it will push such free end out of its way and thereafter upon the backward movement of pin *m* will ride up this incline as before explained. One or both of the supports W and X may be so mounted on the slide U as to be capable of adjustment either toward or away from one another.

The disk support H in addition to having an angular adjustment to the axial lines of chucks *d i* is also made capable of adjustment toward and away from the chucks *d i* and slide U according to the size of blocks of cork to be ground.

s is the piece of cork being ground. This may be accomplished by having the bolt holes in the plate H for the bolts I larger than the said bolts, and thus allowing both angular and longitudinal motion to the plate H. This motion would only be necessary through a small distance, as there is very little difference between the diameters of large and small corks.

Fig. 6 (which is on an enlarged scale) illustrates the cam P to impart the requisite motion to the slide U and the accuracy and delicacy of the motion thus imparted is a very important factor to the success of my machine.

Referring now to Fig. 6—*n* represents the actual cam surface which is secured to a plate with side walls *o* all round thus forming a channel or cam-way *p* all round—which is kept well lubricated and in which a roller or other device on the end of the rocking arm R travels or works and is operated by the said cam and so gives the requisite motion to slide U through the connecting rod T.

The following are essential conditions to be observed in making cam *n* to work according to my present invention. About eighty per cent. of the whole of the cam surface *n* is utilized to give the feed motion (toward the abrading disk) from the point where the cork block first touches the said grinding surface steadily decreasing the speed of the advance in exact ratio until finally coming to rest for a moment so as to allow a final finishing off. About eleven per cent. of the cam surface (by means of a sharp curve of the cam) allows the slide U to quickly travel back and then about nine per cent. of the cam surface quickly advances the slide U from its rearmost position to just reach the face of the abrading disk and then the remaining eighty per cent. or thereabout of the cam surface is utilized to give a prolonged and slowly decreasing advance of the slide so as thus to give the exact required pressure of the cork *s* against the abrading disk D to quickly and properly grind the piece of cork into shape and yet not so violently advance the said piece of cork as to force same out of the chucks *d i*.

The only manual labor required in connection with this machine is to feed the "squares" or "quarters" of cork onto the feed table or rest Y which is adjustable toward and away from the abrading disk D by means of the adjusting screw *l* so as to exactly or as near as possible center the piece of cork ready to be seized by the chucks *d i*. The gage Z serves also in this connection to permit each piece of cork to be placed in the correct suitable position ready to be seized by the two chucks *d i* on the next backward movement of the slide U—the gage Z being fixed and carried on the slide U so that this gage Z is moved out of the way of the chuck *d* at each backward movement of the slide U.

The operation of the machine is as follows:—The machine is set going by the belt operating handle L or by any other suitable means and the "square" or "quarter" of cork to be ground is placed on the rest Y. The slide U comes back and at about its rearmost limit the chuck *i* is released (as before ex-

plained) and with chuck *d* snaps hold of the piece of cork on the rest Y and then rapidly advances toward the disk D until the cork begins to touch the abrading disk D whereupon the cork holding chucks begin to rapidly rotate but very slowly advance toward the disk D (by means of the cam—as just previously described) and then when the grinding is finished the cork carriers rapidly retire from the disk and immediately thereupon the one chuck *d* is automatically thrown out of connection and said chuck ceases to revolve while the spindle of the other chuck is pulled back (as before explained) and lets the ground cork *s* drop out down the chute C and snaps hold of the next cork block and so on.

A very essential part of my present invention consists in the said regulated approach of the cork so that no time is lost between the moment of finishing the last cork (dropping same during the quick retirement of the slide) and picking up the next piece of cork to be shaped and conveying it rapidly toward the grinding surface and then as contact is made the said piece of cork (cork blank) is very quickly rotated while at the same time a very slow movement forward is imparted until the desired amount of grinding has taken place and thereafter if desired the slide may come to an absolute rest for a moment while a finishing touch is given to the ground cork.

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

1. In a machine of the character described, the combination of a revolving disk faced with abrading material, a slide adapted to approach and to recede from said disk, a cork gripping chuck mounted on said slide, a revolving cam and mechanism operated thereby for moving said slide toward and for drawing it away from said disk, and means for revolving said chuck, substantially as and for the purposes described.

2. In a machine of the character described, the combination of a revolving disk faced with abrading material, a slide adapted to approach and to recede from said disk, a cork gripping chuck mounted on said slide, a revolving cam, a roller engaging said cam and a rod connected to said roller and pivoted to said slide, said cam and rod being adapted to move said slide slowly toward said revolving disk and to draw it rapidly away therefrom, and means for revolving said chuck, substantially as and for the purposes described.

3. In a machine of the character described, the combination of a revolving disk faced with abrading material, a slide adapted to approach and to recede from said disk, a cork gripping chuck mounted on said slide; a shaft extending from said chuck; means for moving said slide toward and for drawing it away from said disk; a rocking arm pivoted on said slide and provided at one end with a clutch piece engaging in a feather in said chuck shaft and provided at the other end with a roller; a similar chuck piece and means of revolving the same, a spring normally pressing on said rocking arm and an inclined piece *g* stationary relative to said slide and adapted to intermittently bear against said roller and put said clutch pieces into engagement and so revolve said cork-holding chuck, substantially as and for the purposes described.

4. In a machine of the character described, the combination with revolving disk D faced with abrading material of the slide U adapted to approach and to recede from said disk, a table Y on said slide for holding the cork means for adjusting the cork on said table, a chuck also mounted on said slide and adapted to snap hold of said cork and remove it from said table, a revolving cam and mechanism operated thereby for moving said slide toward and for drawing it away from said disk D, and means for revolving said chuck, substantially as and for the purposes described.

5. In a machine of the character described, the combination with the revolving disk D faced with abrading material of the slide U adapted to approach and to recede from said disk, a table Y on said slide for holding the cork, means for adjusting the cork on said table, a chuck also mounted on said slide and adapted to snap hold of said cork and remove it from said table, a revolving cam, a roller engaging said cam, and a rod connected to said roller and pivoted to said slide, said cam and rod being adapted to move said slide slowly toward said revolving disk and to draw it rapidly away therefrom, and means for revolving said chuck, substantially as and for the purposes described.

JOHN EISENHARDT HOWARD.

Witnesses:

HENRY BIRKBECK,

34 *Southampton Buildings, London, England.*

THOMAS LAKE,

17 *Gracechurch Street, London.*