(No Model.) 7 Sheets—Sheet 1.

J. SCHLACHTER.

CORK CUTTING MACHINE.

No. 246,823. Patented Sept. 6, 1881.

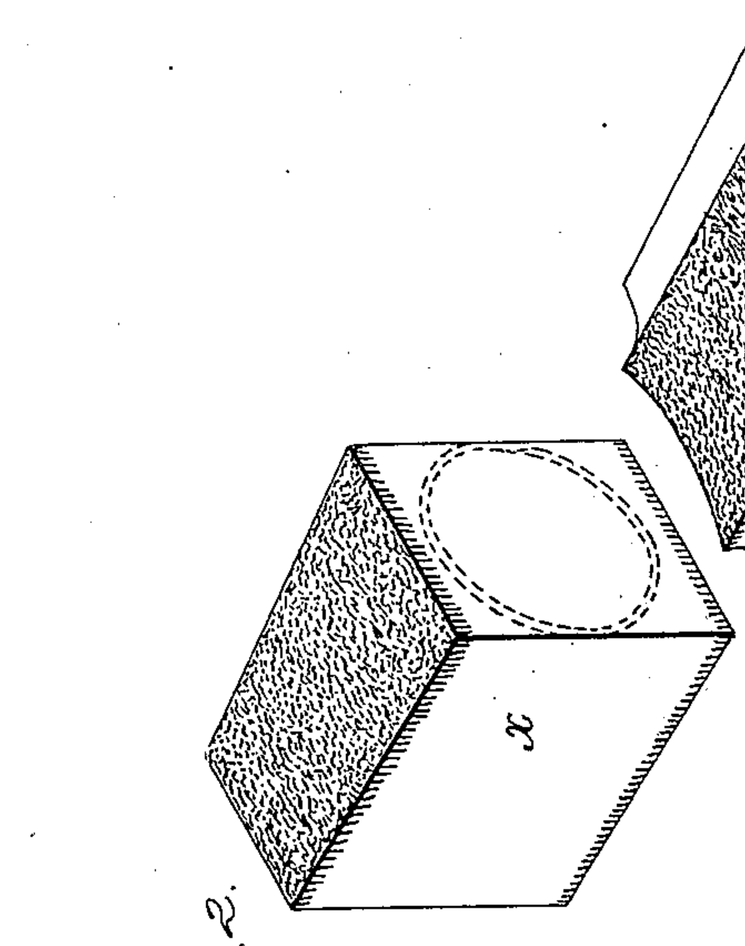

FIG. 2.

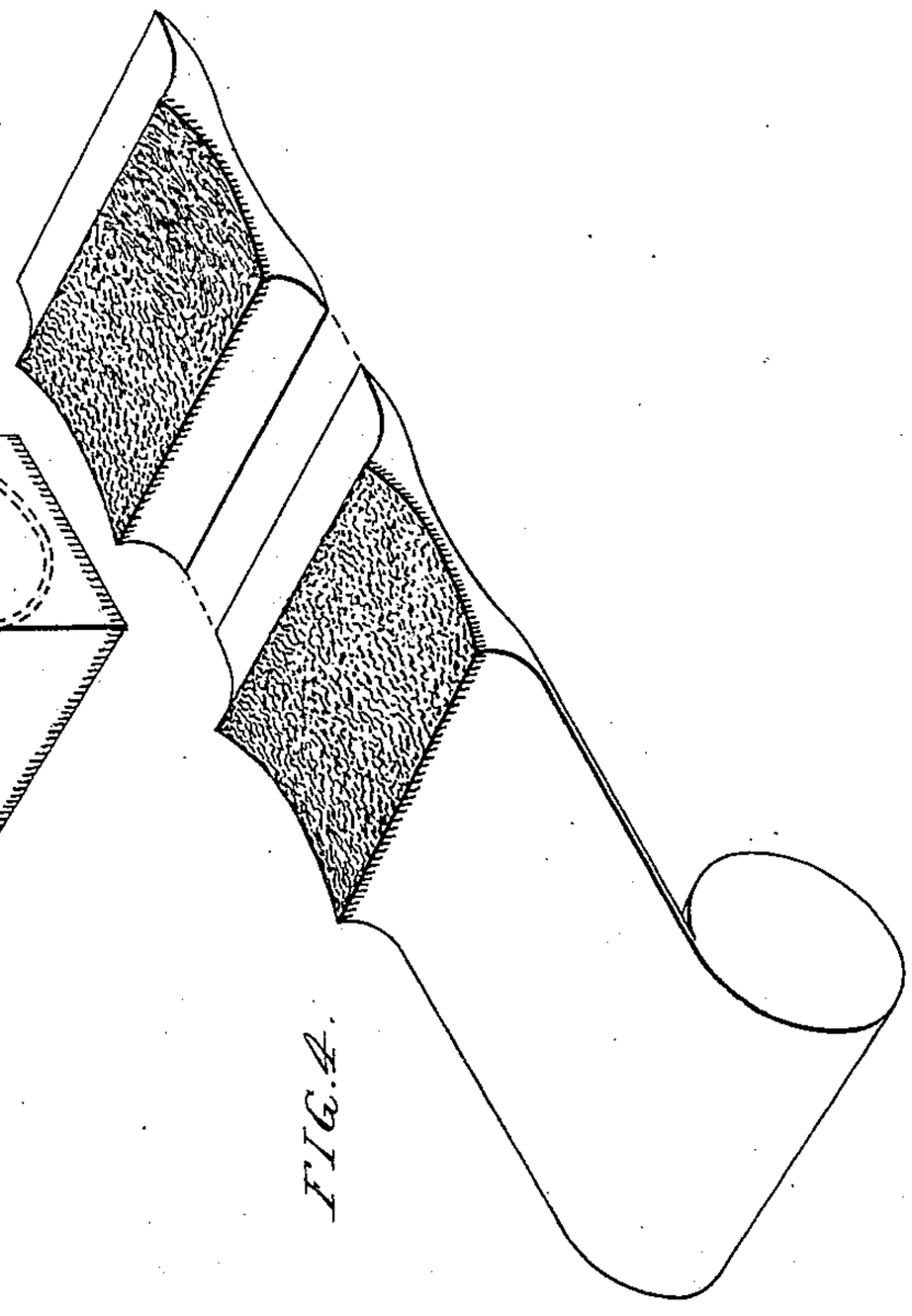

FIG. 4.

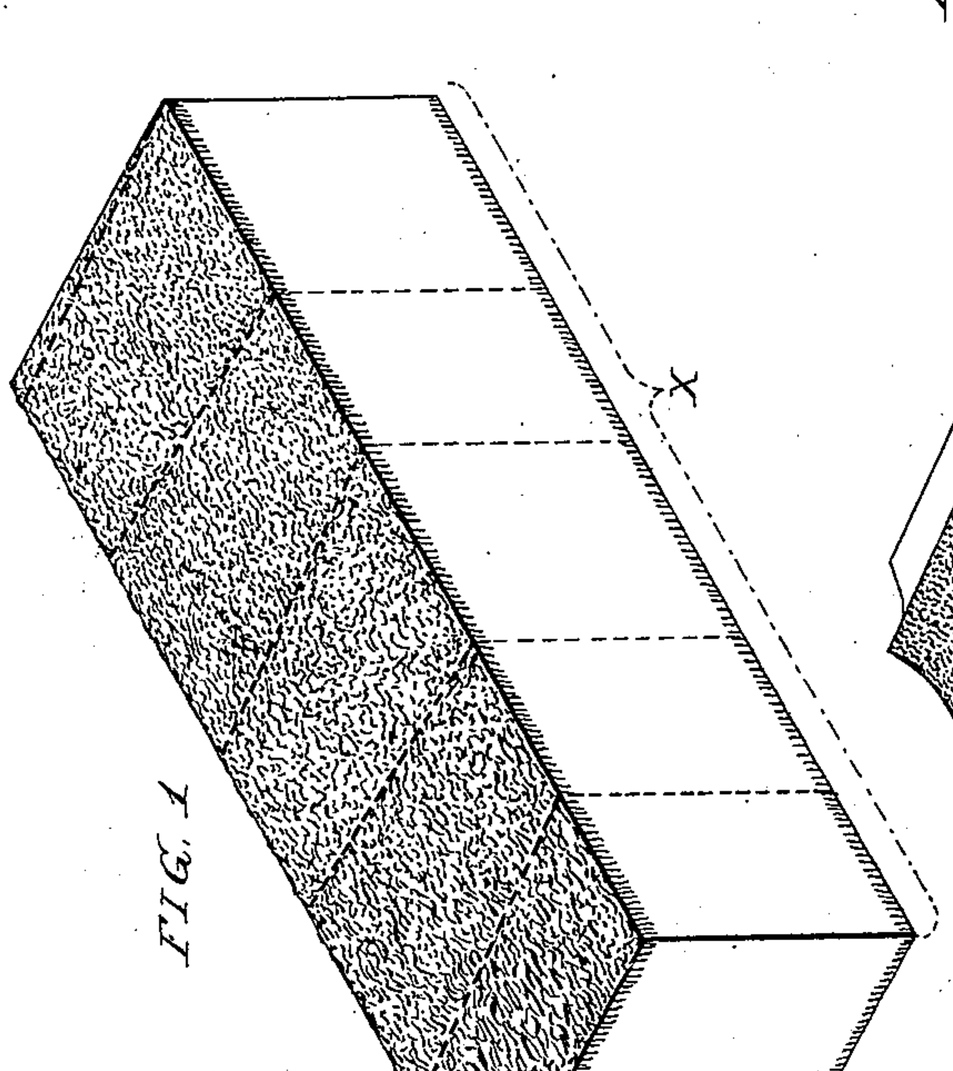

FIG. 1

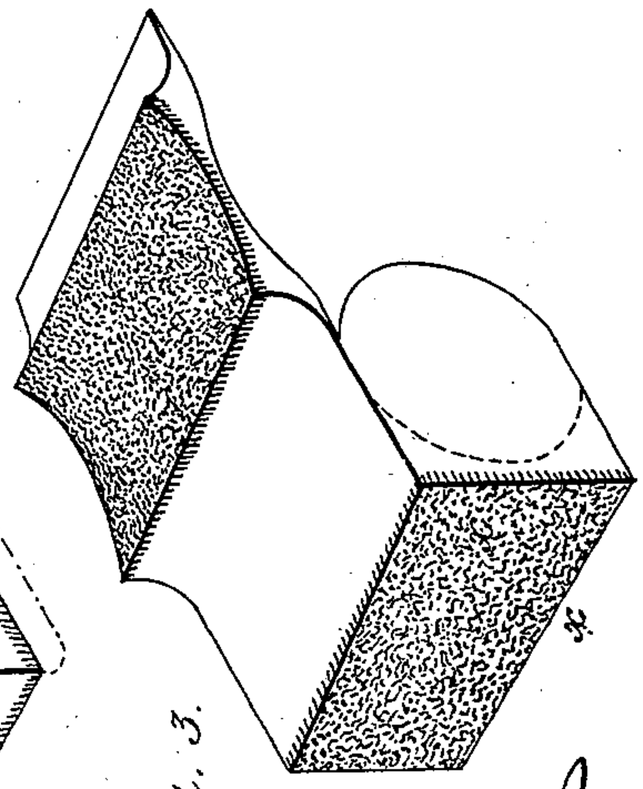

FIG. 3.

Witnesses

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(No Model.) 7 Sheets—Sheet 2.

J. SCHLACHTER.

CORK CUTTING MACHINE.

No. 246,823. Patented Sept. 6, 1881.

FIG. 7.

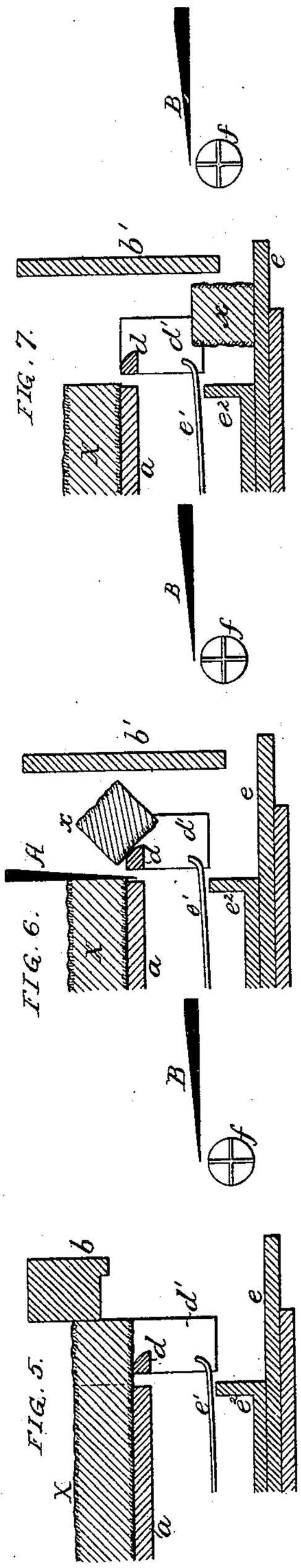

FIG. 10.

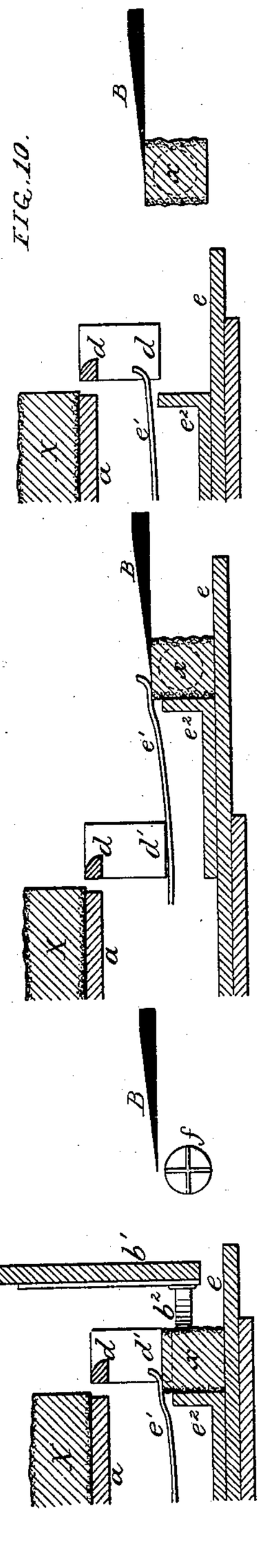

FIG. 13

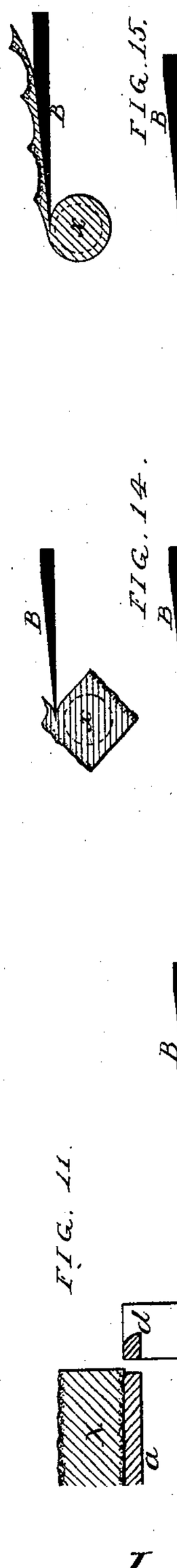

FIG. 15.

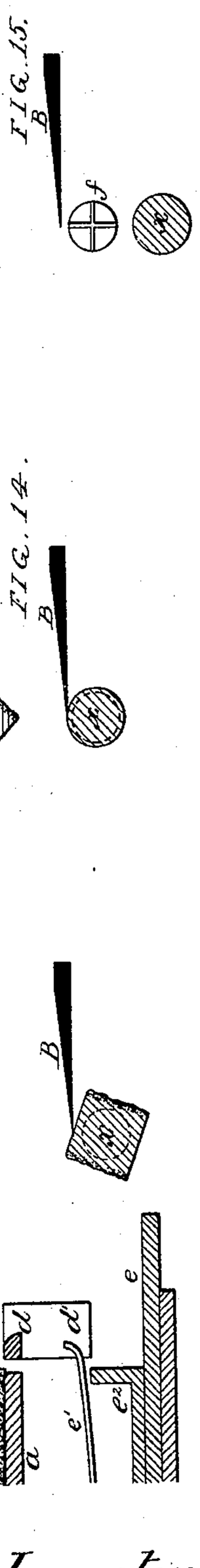

FIG. 6.

FIG. 9.

FIG. 12.

FIG. 14.

FIG. 5.

FIG. 8.

FIG. 11.

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CORK CUTTING MACHINE.

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FIG. 16.

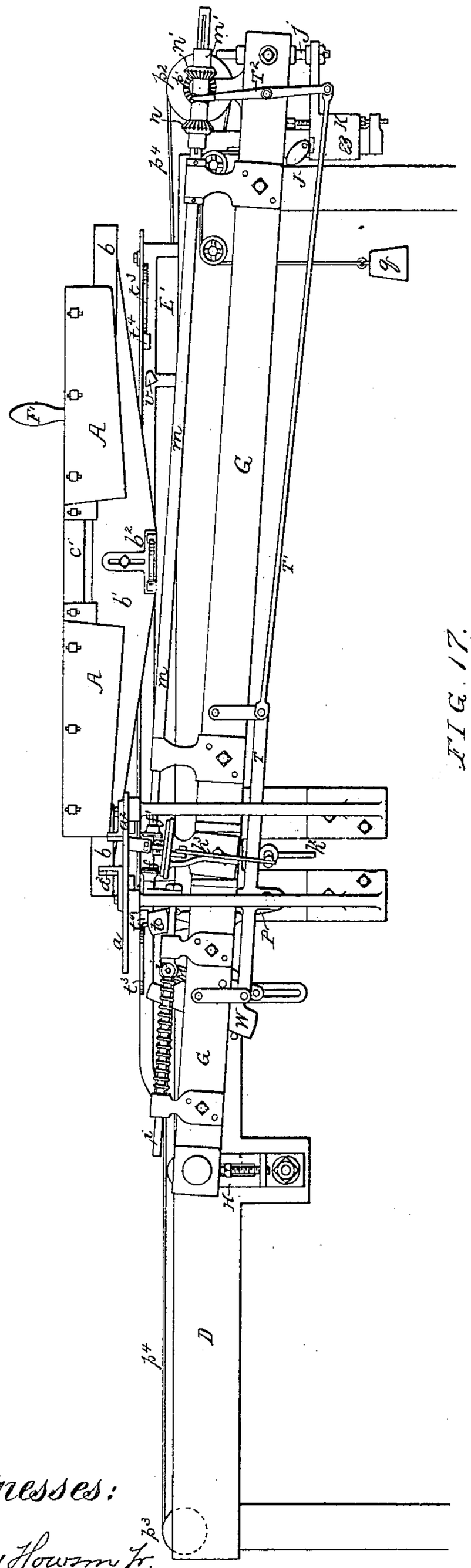
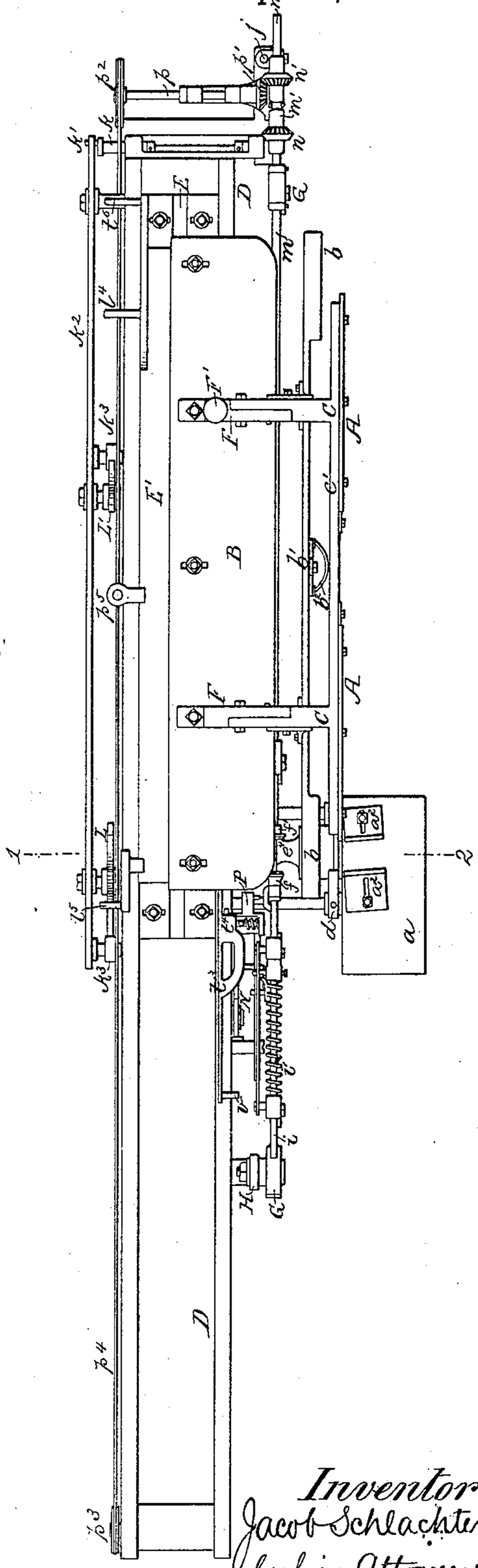


FIG. 17.



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CORK CUTTING MACHINE.

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FIG. 18.

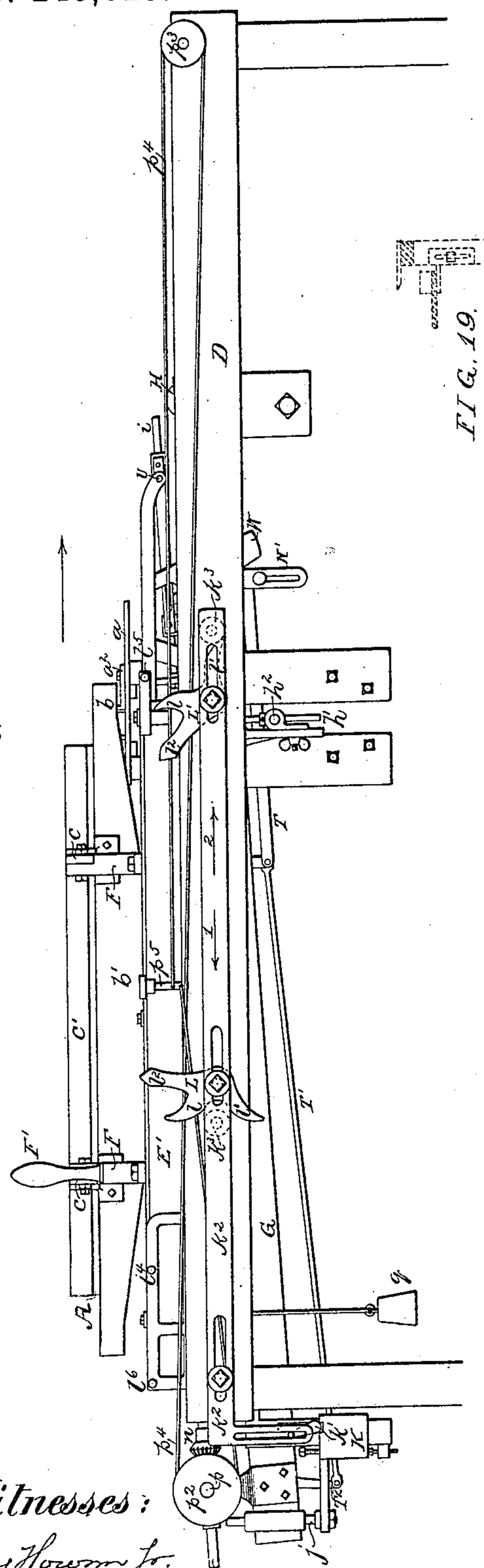


FIG. 19.

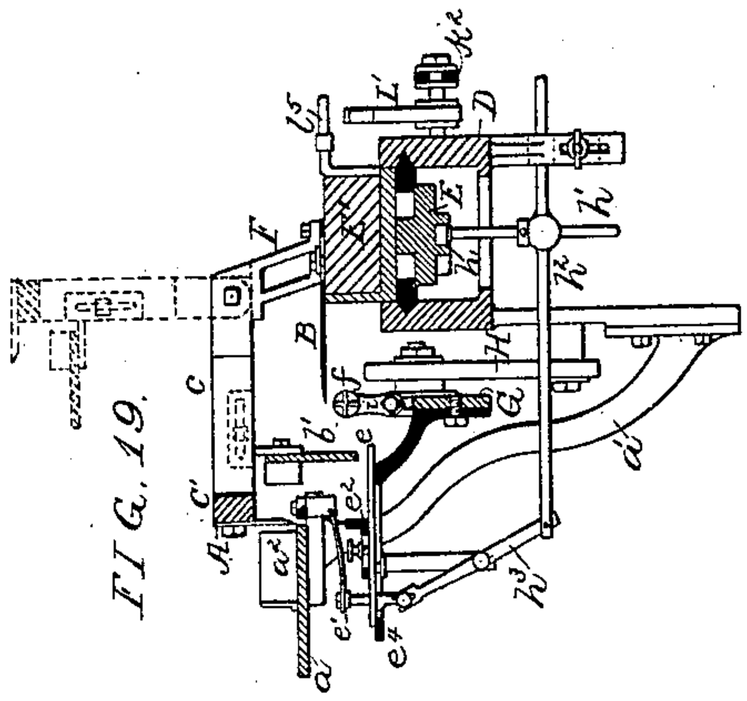
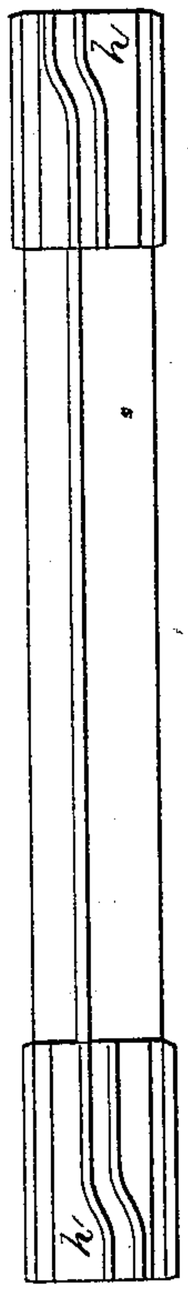


FIG. 22.



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(No Model.) 7 Sheets—Sheet 5.

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CORK CUTTING MACHINE.

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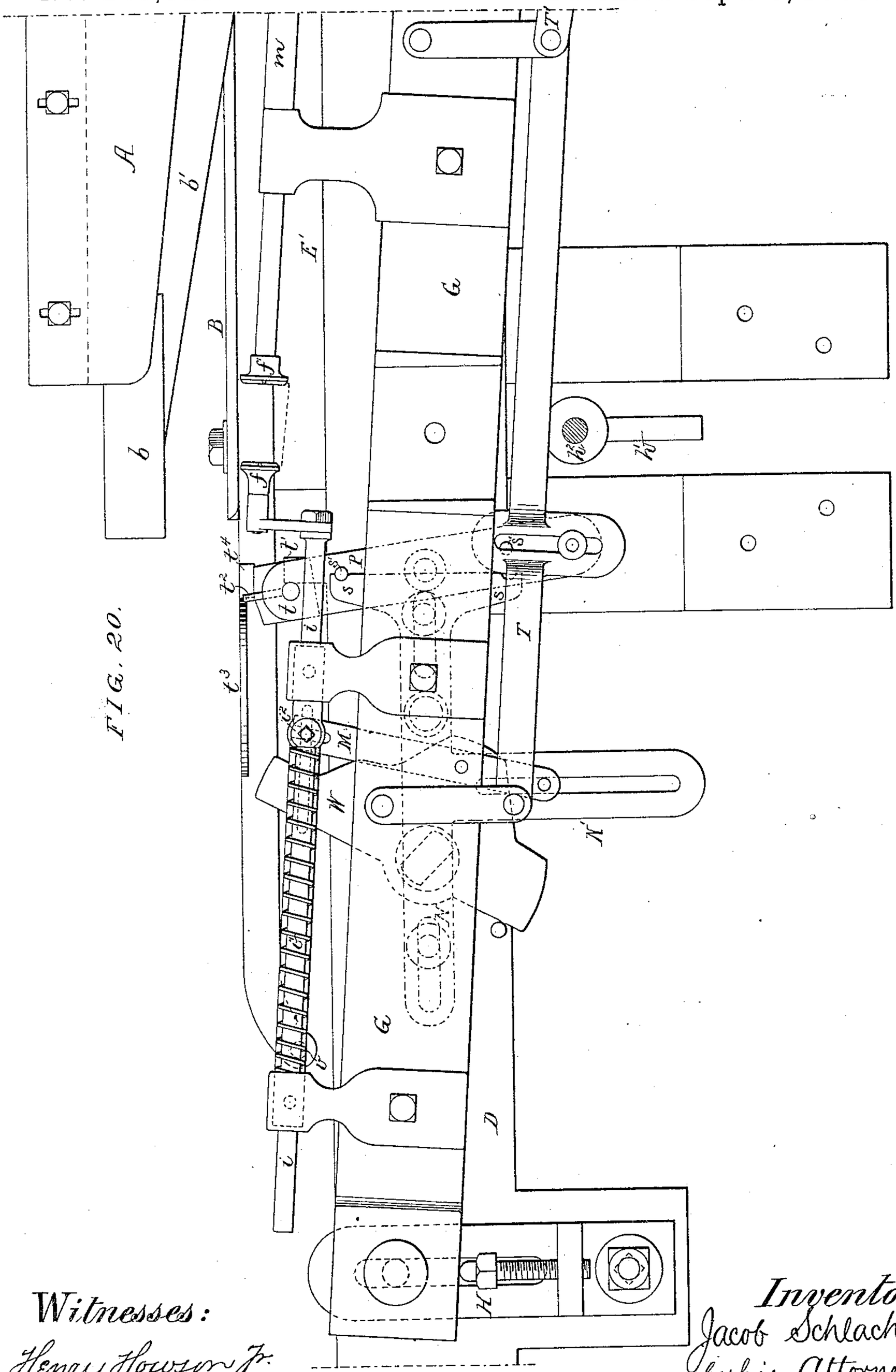

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(No Model.) 7 Sheets—Sheet 6.

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CORK CUTTING MACHINE.

No. 246,823. Patented Sept. 6, 1881.

FIG. 25.

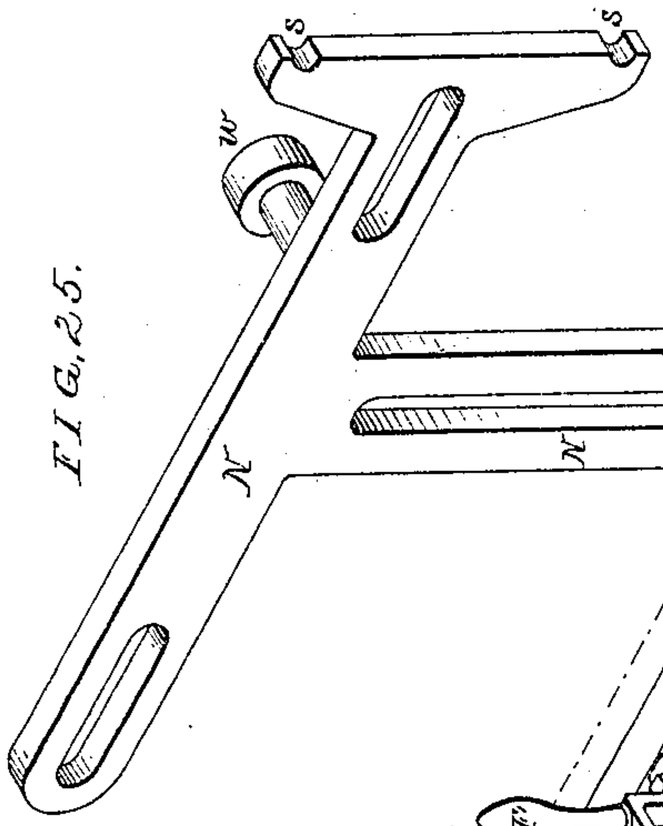


FIG. 23.

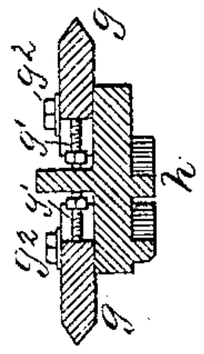


FIG. 21.

FIG. 22.

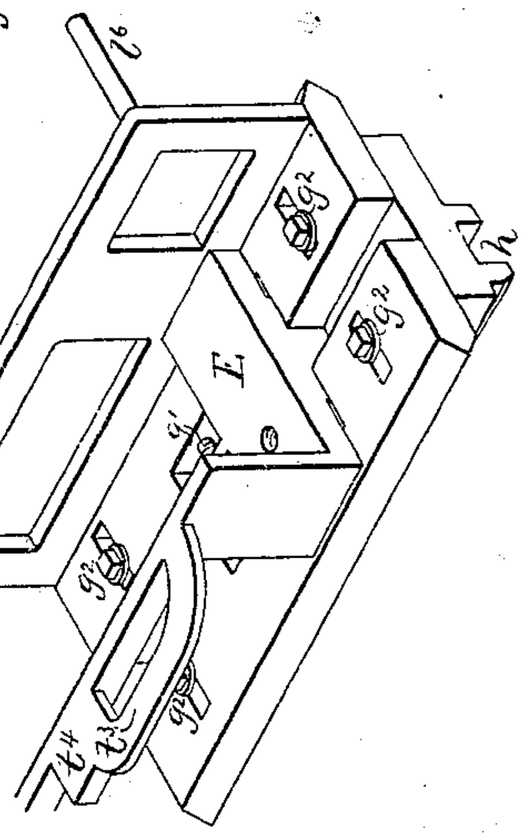
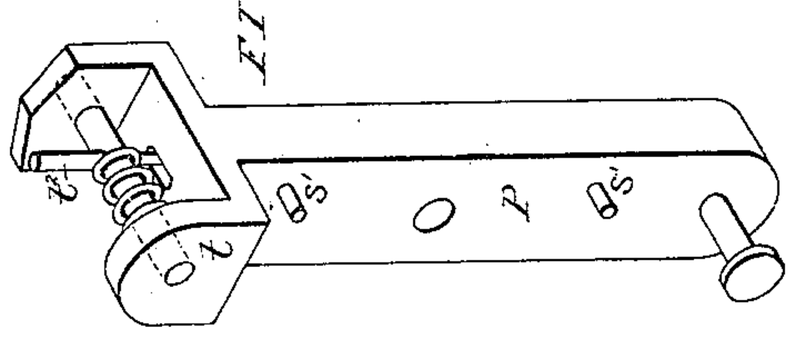


FIG. 26.



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(No Model.) 7 Sheets—Sheet 7.

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CORK CUTTING MACHINE.

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FIG. 27.

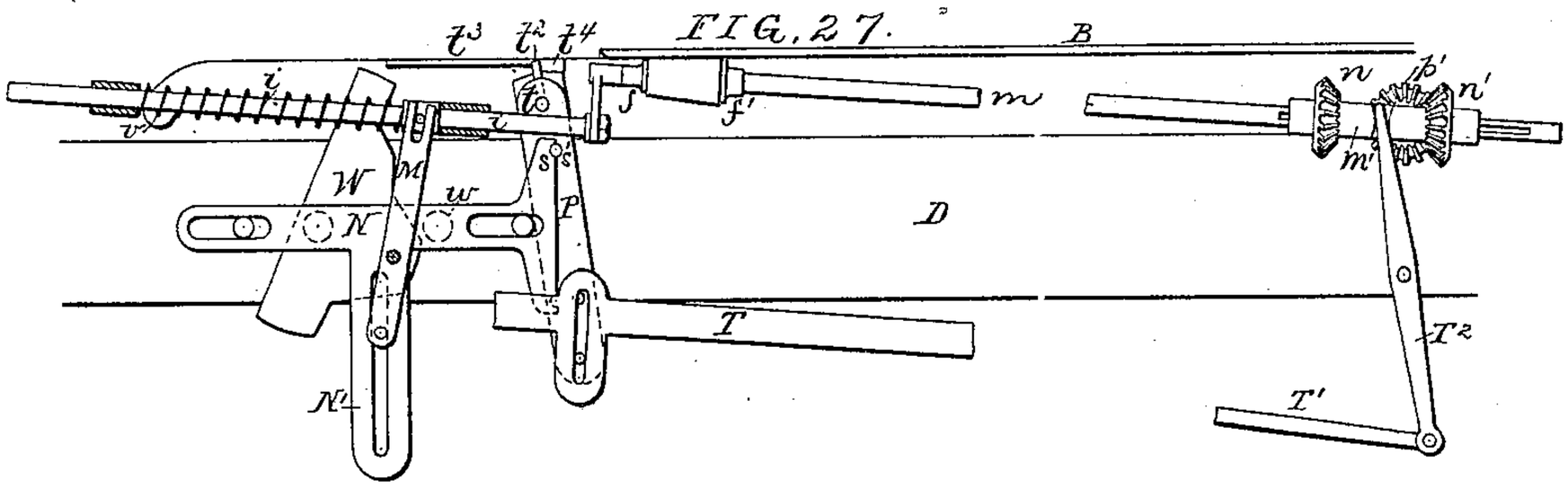


FIG. 28.

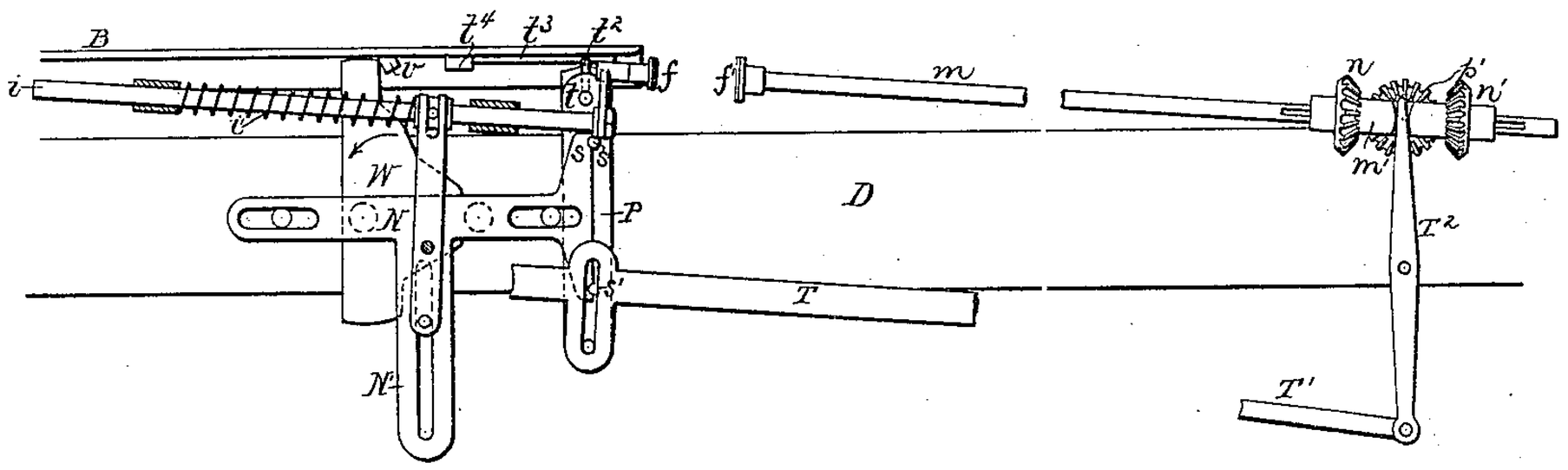


FIG. 29.

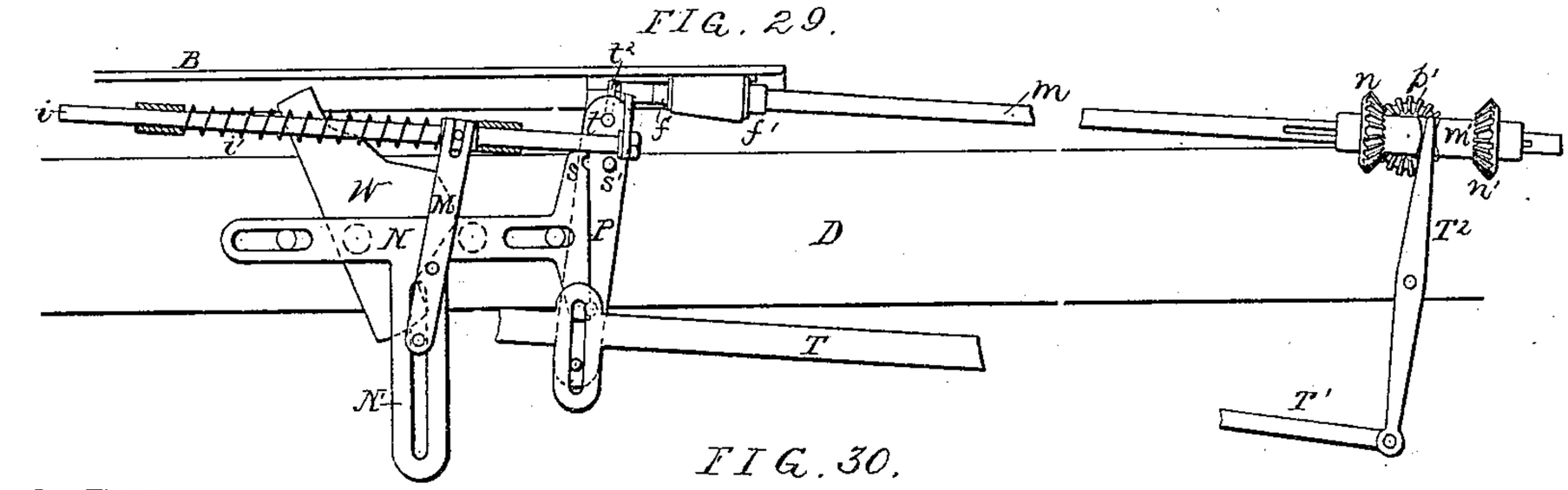


FIG. 30.

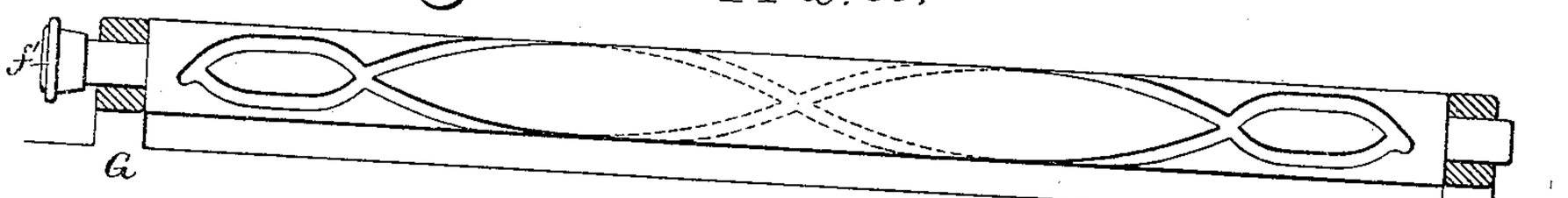
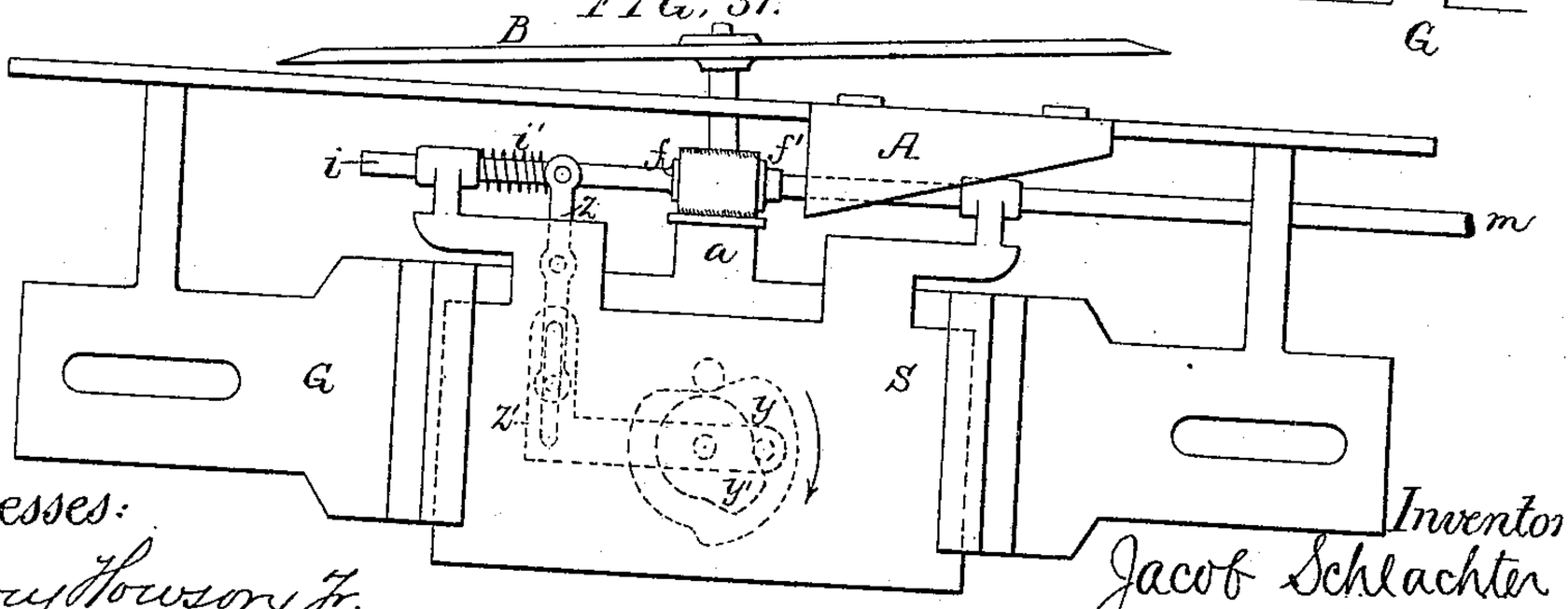


FIG. 31.



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UNITED STATES PATENT OFFICE.

JACOB SCHLACHTER, OF PHILADELPHIA, PENNSYLVANIA.

CORK-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 246,823, dated September 6, 1881.

Application filed October 11, 1880. (No model.)

To all whom it may concern:

Be it known that I, JACOB SCHLACHTER, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Cork-Cutting Machines, of which the following is a specification.

The object of my invention is to construct a machine for rapidly and accurately making from strips of cork-wood finished corks, either straight or of any degree of taper. The invention comprises certain features of construction and combinations of parts too fully described hereinafter to be dwelt upon at length in this part of the specification.

In the accompanying drawings, Figures 1, 2, 3, and 4, Sheet 1, are perspective diagrams illustrating the successive stages of manufacture of the cork. Figs. 5 to 15, inclusive, Sheet 2, are sectional diagrams illustrating the different operations of the machine in making the cork, those portions only of the machine which act directly on the blank being shown. Fig. 16, Sheet 3, is a front view, and Fig. 17 a plan view, of the complete machine; Fig. 18, Sheet 4, a rear view of the same; Fig. 19, a transverse section of Fig. 17 on line 1 2; Fig. 20, Sheet 5, an enlarged front view of part of the machine; Figs. 21 to 29, detached views illustrating features of the construction and operation of the machine, and Figs. 30 and 31 views representing modifications of part of my invention.

In order to facilitate a proper understanding of my improved machine, I will first describe, in connection with Sheets 1 and 2 of the drawings, the successive stages of the manufacture of the cork and the operations of those parts of the machine which act directly upon the cork in the course of such manufacture.

Fig. 1, Sheet 1, represents a strip, X, of cork-wood which has in a separate machine been reduced to a width corresponding with the length of the cork to be produced. This strip is severed on the dotted lines, so as to form without waste a number of pyramidal blanks, *x*, such as shown in Fig. 2, and each of these blanks, while held in a rotating chuck or clamp, is then subjected to the action of a cutting-knife, whereby strips or shavings are removed from the blank, as shown in Figs. 3 and 4, two complete revolutions being imparted to the blank, and the latter, after the first revolution, being so adjusted in respect to the cutting-knife that the latter will make a fresh cut from the partly-finished cork, thereby insuring in the finished cork a perfectly symmetrical shape and a surface free from roughness or inperfection.

The mode of effecting these operations is illustrated in Sheet 2, and is as follows: The strip of cork-wood rests upon a feed-table, *a*, between suitable guide-strips, and is thrust forward so as to project beyond the edge of said table *a*, the front end of the strip abutting against a gage-block, *b*, and the bottom of the projecting portion of the strip resting upon a rounded rib, *d*, secured to or forming part of a plate, *d'*, connected to the table *a*. (See Fig. 5.) A knife, A, severs from the strip X the projecting portion, thus forming the blank *x*, and at the same time the gage-block *b* is removed, its place being occupied by a strip, *b'*, which is arranged at such a distance from the blank *x* that the latter falls onto a table, *e*, the position of the supporting-rib *d* in respect to the blank *x* being such that the blank is caused to turn one-quarter way around in its descent, as shown in Fig. 6, the strip *b'* preventing more than one-quarter of a turn. (See Fig. 7.) The block *b* is removed directly after the commencement of the cutting operation, so as to prevent the binding of the blank between said block and the cutting-knife. The blank *x*, resting upon the table *e*, is now subjected to the action of a spring-presser or cam, b^2, carried by the strip *b'*, the result of which is to thrust the blank laterally under the end of a spring-finger, *e'*, and against a gage-block, e^2, carried by said table *e*, longitudinal movement of the blank by the presser or cam b^2 being prevented by the plate *d'*. (See Fig. 8.) The strip *b'* is removed and the table *e* moves forward, carrying with it the blank *x*, the movement continuing until the blank is brought between a pair of clamping-jaws, *f f'*, (one only of which is shown,) these clamping-jaws being immediately beneath the edge of a cutting-knife, B. (See Fig. 9.) The table *e* is then retracted, as shown in Fig. 10, leaving the blank *x* clamped between the jaws *f f'*, which commence to turn, as shown in Fig. 11, so as to press the face of the blank

against the cutting-edge of the knife B. The object of turning the blank one-quarter way round as it drops onto the table *e* will now be understood, for on reference to Fig. 11 it will be observed that the knife B commences to cut on a sheared face of the blank, where the wood is soft, whereas, if the blank had not been turned as described, the knife B would commence to cut on a side of the blank covered by the hard skin or bark of the cork-wood strip, and the cutting-edge of the knife would rapidly become dull. Moreover, if the knife commenced to act on the hard bark of the cork-wood, the result would be a severe strain on the blank and a tendency to throw the same out of center, the cut being more in the nature of a chipping operation than the smooth shearing cut which results when the knife commences to act on the soft face of the blank. Another advantage of turning the blank part way around is that the cut portions of the blanks are always of a certain thickness for each grade of cork, and when a cut face is presented to the knife the work-holding jaws can be so set in respect to said knife that the latter will rest lightly on and move easily over the flat face of the blank, and will commence to cut at the proper point on each blank, whereas, if the blank were not turned as described, the action of the knife would be irregular, owing to the fact that the strips of cork-wood vary considerably in thickness. The clamping-jaws *f f'* continue to revolve and the knife B cuts from the blank *x* strips, as shown in Fig. 12, and as soon as one revolution has been imparted to the blank the jaws *f f'* and the blank are elevated, as shown in Fig. 13, and the knife B commences to cut a shaving from the surface of the partly-finished cork, so that at the conclusion of the second revolution the cork will have been reduced to symmetrical form and will have a smooth surface, free from imperfections, as shown in Fig. 14, after which it only remains for the clamping-jaws to release the finished cork, as shown in Fig. 15, said cork falling into a suitable receptacle.

It should be understood that while the blank *x* is being reduced by the knife B to the form of a cork a fresh blank is being cut and brought into position for presentation to the clamping-jaws *f f'* as soon as the finished cork drops therefrom, so that the machine is practically continuous in its operation.

I will now proceed to describe the mechanism whereby the various parts shown in Figs. 5 to 15 are operated, the said mechanism being illustrated by Figs. 16 to 29.

D is the main frame of the machine, to suitable longitudinal guides in which is adapted a carriage, E, by the reciprocation of which the operation of all of the other parts of the machine is effected. To this carriage E is secured a block, E', of wood, and to the upper face of the latter is attached the cutting-knife B, said knife being slotted for the reception of the securing-bolts, so that it can be readily adjusted laterally to compensate for wear. To the knife B are bolted two frames, F F, one of which is provided with the operating-handle F'. To the frames F are hinged arms *c*, carrying a longitudinal bar, *c'*, to which are bolted two cutting-knives, A, (see Fig. 21;) and to said arms *c* is also secured the longitudinal strip *b'*, above referred to, which is enlarged at each end to form gages *b*, there being one of these for each knife A, and the machine being of a duplex character—that is to say, capable of making a complete cork for each longitudinal reciprocation of the carriage E, one knife A acting to sever the blank on the forward movement of the carriage and the other knife A performing this duty on the backward movement. The object of hinging the arms *c* to the frames F is to permit the said arms and the knife-carrying bar to be thrown back, as shown by dotted lines in Fig. 19, when it is desired to gain access to the cutting-edges of the knives A for the purpose of sharpening the same.

The carriage E has at each end bearing-blocks *g*, which are adjustable laterally by means of set-screws *g'*, so as to compensate for wear, the blocks being held in position, after adjustment, by clamping-bolts g^2. In order to gain access to the set-screws *g'* for adjusting purposes, it is necessary to remove the block E', which is therefore so secured to the carriage E as to be readily detachable vertically therefrom without disturbing the connection of the knife B to the block or the relation of said knife B to the knives A and strip *b'*.

The feed-table *a* is supported by arms *a'* on the frame D, (see Fig. 19,) and has two guides, a^2, which, when tapered corks are to be made, are set at an angle, as shown in Fig. 17, the strip of cork in this case being reversed after each blank is cut therefrom, so that the cuts will be made as shown by dotted lines in Fig. 1, each blank being of the proper pyramidal form to produce a tapered cork. The guides a^2 are adjustable, so that they can be set in accordance with the desired taper of the cork to be produced.

The spring pusher or cam b^2, which thrusts the cork against the gage on the sliding table *e*, is connected to the center of the strip *b'* at a point near the lower edge of the same, so as to properly act on the blank as said strip is reciprocated. A cam near each end of the strip *b'* may be substituted for the central cam, b^2, in some cases. The reciprocation of the table *e* is effected by a pair of cams, *h*, on the under side of the carriage E, (see Fig. 24,) through the medium of a pin, *h'*, a rod, h^2, and a lever, h^3, the table *e* being guided in a frame, e^4, which is secured to a bar, G, at the front of the machine, and has an arm, to which the lever h^3 is pivoted. The frame e^4 is adjustable vertically to suit different-sized corks, and the rod h^2 and a guide on the frame D, to which said rod is adapted, are also adjustable vertically, so as to preserve their proper relation to the table *e*.

The bar G, above alluded to, carries the clamping-jaws *f f'* and the devices whereby the rotation of said jaws and the opening and closing of the same are governed. The jaw *f* turns loosely in an arm on the end of a spindle, *i*, adapted to bearings on the bar G; but the jaw *f'* is secured to the end of a shaft, *m*, which is also adapted to bearings on the bar G, and carries near its opposite end a sleeve, *m'*, and two bevel-wheels, *n n'*. A transverse shaft, *p*, is adapted to bearings at this end of the bar G, this shaft carrying at the front end a bevel-pinion, *p'*, and at the rear end a pulley, p^2, around which and round an idler-pulley, p^3, at the opposite end of the frame D passes a belt, p^4, the ends of which are connected to a stud, p^5, on the carriage E. As the carriage is reciprocated movements in opposite directions are imparted to the shaft *p* and pinion *p'*, so that, by shifting the sleeve *m'* so as to throw the bevel-wheel *n* into gear with the pinion *p'* when the latter turns in one direction and the wheel *n'* into gear when the pinion turns in the opposite direction, a rotary movement in a forward direction only will be imparted to the shaft *m*, while by adjusting the sleeve *m'* to such a position that neither of the wheels *n n'* gear with the pinion *p'* the rotation of the shaft *p* will not affect the shaft *m*.

The bar G is pivoted at one end to a frame, H, adjustable vertically on the main frame D, and the opposite end of the bar rests upon a cam, J, carried by a rock-shaft adapted to bearings on a frame, K, also adjustable vertically in respect to the main frame, so that by properly adjusting the frames H and K the position of the bar G and of the work-holding jaws *f f'* in respect to the cutting-knife B may be varied as the size of the cork and the required taper of the same may suggest, while by operating the cam J the bar G may be caused to swing on its pivot, so as to elevate the work-holding jaws and the blank carried thereby when it becomes necessary to make the second cut in completing the cork, as described in the first part of the specification.

The free end of the bar G is guided by a vertical pin, *j*, on the frame K, and the weight of the bar G is counterbalanced by a weight, *q*, so that the duty of the cam J is comparatively light. The cam J is carried by a rock-shaft, *k*, adapted to bearings on the frame K, and having at the rear end an arm, *k'*, a pin on which is adapted to a vertical slot in a bar, k^2, adapted to suitable guides on the rear of the frame D, and provided with anti-friction rollers k^3, upon which act cam-levers L L', hung to the frame D. Each of these levers L L' has three arms, *l*, *l'*, and l^2, the arms *l* and *l'* acting on the rollers k^3, and the arms l^2 being acted upon by pins l^4, l^5, and l^6 on the carriage E.

When the parts are in the position shown in Fig. 18 the carriage E has just commenced to move forward in the direction of the arrow, the bar G is depressed, and the knife is making the first cut from the blank. As the carriage moves forward the pin l^4 strikes the arm l^2 of the lever L, and thereby effects the movement of the bar k^2 in the direction of the arrow 1, and a consequent operation of the cam J and elevation of the bar G, so as to enable the knife B to commence the second cut. When the carriage E reaches the limit of its movement in the direction of the arrow the pin l^4 acts on the lever L' and causes a movement of the bar k^2 in the direction of the arrow 2, and a consequent lowering of the bar G preparatory to the return-stroke of the carriage, during which the pin l^6 actuates the lever L to raise the bar G, and the pin l^5 at the end of the stroke actuates the lever L', so as to again depress the bar.

The means whereby the opening and closing of the work-holding jaws *f f'* are effected and the rotation of the same governed are shown in the enlarged view, Fig. 20, and in the diagrams, Figs. 27, 28, and 29.

The spindle *i*, carrying the jaw *f*, is acted upon by a spring, *i'*, and has a collar, i^2, a pin in which is adapted to the slotted upper end of the long arm of a lever, M, hung to the bar G, the short arm of the lever having a pin adapted to a slot in an arm, N', of a guided bar, N, the end of which is T-shaped, and has two notches, *s s*, adapted for the reception of pins *s'* on a lever, P, hung to the frame D. The upper end of this lever P carries a spring-pin, *t*, which engages with a projection, *t'*, on the frame D, and has a stem, t^2, adapted to be acted upon by cams t^3 on the carriage E, blocks t^4 on said carriage, adjacent to the cams t^3, serving to act on the beveled upper end of the lever in the manner described hereinafter. The lower end of the lever P has a pin adapted to a slot in a bar, T, which is hung by links to the bar G, and is connected by means of a rod, T', to one arm of a lever, T^2, the other arm of which is adapted to a groove in the sleeve *m'*, carrying the pinions *n n'*, whereby the work-spindle *m* is operated.

Hung to the frame D is a cam-lever, W, adapted to act on a pin or roller, *w*, on the bar N, the upper arm of the lever being acted upon, as described hereinafter, by lugs or projections *v* on the carriage E.

It will be observed that there is a cam, t^3, block t^4, and lug *v* at each end of the carriage E, one set serving to operate the levers P and W at the conclusion of the movement of the carriage in one direction and the other set effecting such operation on the conclusion of the movement of the carriage in the opposite direction.

When the parts are in the position shown in Figs. 20 and 27 the carriage E and its knife B are moving in the direction of the arrow and the knife is just commencing to cut the blank, which is firmly griped by the jaws *f f'*, the bevel-wheel *n'* being in gear with the pinion *p'*, and being retained in this position owing to the fact that the lever P is locked in position by the engagement of its spring-pin *t* with

the projection t' of the frame D. The jaw f is also locked in position, any rearward movement of the spindle i being resisted by the lever M, which is prevented from moving by the bar N, the upper notch, s, in which engages with the upper pin, s', of the lever P. When the carriage E has almost finished its traverse in the direction of the arrow and the knife B has finished its cut, the cam t^3 at the rear end of the carriage acts on the stem t^2 of the spring-bolt t and forces the latter back so as to clear the projection t' on the frame. The lug v then acts upon the upper end of the lever W and moves the same in the direction of the arrow, Fig. 28. The cam-face of the lever acts upon the pin w of the bar N and moves the same toward the lever P, which is thus brought into a vertical position, both pins s' of the lever resting in the notches of the bar N and the end of the spring-bolt t bearing against the rear face of the projection t' of the frame. The movement of the bar N is also transmitted, through the medium of the lever M, to the spindle i, which, with its jaw f, is retracted, so as to release the finished cork and compress the spring i'. The movement of the lever P is transmitted, through the medium of the bar T, rod T', and lever T^2, to the sleeve m', which is moved to the intermediate position, so as to carry the bevel-wheels n n' out of gear with the pinion p', as shown in Fig. 28. The forward movement of the carriage E continues until the cam-face of the lever W ceases to bear against the pin w on the bar N, when the movement of the carriage is reversed, a fresh blank having been placed by the feeding device between the jaws $f f'$. As the cam-face of the lever W ceases to act on the pin w the spring i' on the spindle i recoils and causes the jaws $f f'$ to gripe the blank, the same movement being imparted through the medium of the lever M to the bar N, which is moved to the position shown in Fig. 29, so as to free the lever P and permit the latter to be moved to the position shown in said Fig. 29 by the action of the block t^4 on the crown of the beveled upper end of said lever, the carriage E and knife B having now commenced its return movement. The blank is now being rotated, owing to the fact that the above-described movement of the lever P was transmitted through the bar T and rod T' to the lever T^2, thereby effecting such a movement of the sleeve m' as to bring the bevel-wheel n into gear with the pinion p'.

It will be noticed that, although the spring i' effects the closing of the jaws $f f'$ on the blank, said spring does not have to resist the longitudinal thrust of the knife on said blank, as the engagement of the bolt t of the lever P with the projection t' of the frame D exerts a locking effect on the spindle i through the medium of said lever P, the bar N, and the lever M, so that the separation of the jaws and the premature release of the blank and interference with the cutting operation are effectually prevented.

In light machines for the manufacture of small corks the above-described devices for rotating the work-holder may be dispensed with, the device which I prefer to use in this case being shown in Fig. 30, and consisting of a simple scroll-cam, the spindle of which carries at one end the jaw f'. This spindle should be adapted to suitable bearings on the bar G, and the cam should be so arranged in respect to the carriage E that a block carried by the latter will engage with the slot of the cam, the character of the latter being such that on each movement of the carriage there will be the desired double revolution of the work-holder and the necessary dwell at each end of the stroke. The block should also be capable of moving vertically in respect to the carriage, so as to accommodate it to the inclination and to the different elevations of the scroll-cam demanded by the varying character of the cork to be cut.

In Fig. 31 I have shown the adaptation of some of the features of my invention to a power-machine, in which the cutting-knife B is circular and is rotated instead of being straight and having a reciprocating motion, as in the hand-machine described in the beginning of this specification. In this case the bar G carries the feed-table a, and the knife A is adapted to and slides on a rod carried by said bar G, the reciprocation of the knife at the proper intervals being effected in any suitable manner from some moving part of the machine.

The spindle i and shaft m, carrying the jaws $f f'$, are adapted to bearings on a carriage, S, adapted to guides on the bar G, and capable of moving vertically under control of a cam, y.

To the spindle i is connected one arm of a lever, z, which is hung to the carriage S, and the other arm of which has a pin adapted to a slot in a slide, z', projections on which are acted upon by a cam, y', on the same shaft as the cam y.

When a blank has been cut by the knife A and rests upon the table a the carriage S is permitted to descend, and at the same time the jaws $f f'$ are separated by the action of the cam y' on the slide z' and lever z. When the jaws are in line with the blank said cam y' effects the closing of the same, so that they will gripe the blank, and the cam y then effects the elevation of the carriage S, so as to bring the blank under the action of the rotating knife B, the knife A being at the same time reciprocated, so as to prepare for the severing of another blank from a strip laid on the table a. The cam y has an enlargement, whereby the slight rise of the carriage S to effect the second cut is accomplished. The driving devices used in connection with the shaft m should be such that they will be thrown into gear as the carriage S rises, and thrown out of gear as the carriage descends, it being advisable to so construct and arrange said driving devices that a quarter-turn will be imparted to the work-holder and the blank before the latter is brought into contact with the knife B, so that

the latter will commence to cut on a sheared face of the blank, as described in the first part of the specification.

It has been usual in cork-machines making two cuts on the blank to employ a stationary work-holder and to elevate and depress the cutting-knife—a plan which fails to produce perfect corks, and is much more difficult of accomplishment than the simple elevation and depression of the work-holder, as in my improved machine.

I claim as my invention—

1. The combination, in a cork-cutting machine, of a rotating work-holder, a knife for cutting blanks from a strip, a knife for cutting said blanks to form corks, and a reciprocating carrier, whereby the cut blank and work-holding jaws are brought into position for the clamping of said blank by the jaws, all substantially as set forth.

2. The combination of the work-table *a*, the feed-table *e* beneath the same, the moving gage *b*, the strip *b'*, and the supporting-bar *d*, adjacent to the end of the table *a*, whereby the blank, after being cut, is caused to turn partly around in falling to the table *e*, as set forth.

3. The combination of the feed-table *e*, having a gage, e^2, and retaining-spring *e'*, with the longitudinally-moving strip *b'*, having a spring-presser or cam, b^2, as set forth.

4. The combination of the feed-table *e*, having a gage, e^2, and retaining-spring *e'*, the longitudinally-moving strip *b'*, having a spring-presser or cam, b^2, and the plate *d'*, as set forth.

5. The combination of the carriage E, having a cam, *h*, the guided table *e*, having devices for holding a blank, the lever h^3, rod h^2, and pin *h'*, as set forth.

6. The combination of a cutting-knife, B, moving in a fixed horizontal plane, a rotating work-holder, and a bar, G, carrying said work-holder and its rotating devices, said bar G being pivoted at one end, and acted upon at the opposite end by a cam, J, whereby the position of said bar G in respect to the cutting-knife is automatically changed during the cutting operation, as set forth.

7. The combination of the knife B, the bar G, the work-holder and its operating devices carried thereby, the cam J, rock-shaft *k*, arm *k'*, bar k^2, pins or rollers k^3, cams L L', and carriage E, with pins l^4 l^5 l^6, as set forth.

8. The combination of the frame of the machine, the knife-carrier E, the rotating shaft *p*, having a pinion, *p'*, the shaft *m* for operating the work-holder, and the sleeve *m'*, having bevel-wheels *n n'*, said sleeve being capable of sliding on the shaft *m*, so as to bring either of said wheels into gear with the pinion *p'*, or both out of gear therewith, as set forth.

9. The combination of a work-table, *a*, a rotating work-holder, a frame, D, a carriage, E, adapted to said frame, and carrying both a blank-cutting knife, A, and a cork-cutting knife, B, and a reciprocating carrier, whereby the cut blank and the work-holding jaws are brought into position for the clamping of the blank by said jaws, all as set forth.

10. The combination of a work-table, *a*, a rotating work-holder, a reciprocating carrier, a frame, D, and a carriage, E, having a horizontal cork-cutting knife, B, and a vertical blank-cutting knife or knives, A, as set forth.

11. The combination of the work-table *a*, the rotating work-holder, the reciprocating carrier, the frame D, and the carriage E, having a horizontal cork-cutting knife, B, and a vertical blank-cutting knife, A, inclined upward at each end, so as to cut in both directions, as set forth.

12. The combination of the carriage E, the horizontal knife B, and the vertical knife or knives A, carried by a pivoted bar hung so as to permit the knife or knives A to be turned back over the knife B for sharpening or other purposes, as set forth.

13. The combination of the carriage E, having a knife, B, the work-holder, the bevel-wheel and pinion mechanism for rotating the same, the lever P, connections between said lever and the rotating mechanism, and projections on the carriage for automatically shifting the lever P, as set forth.

14. The combination of the jaw *f* of the work-holder, the spring-actuated spindle of the same, and a locking device, substantially as described, whereby said spindle is held during the cutting operation and released when said operation is completed, as set forth.

15. The combination of the carriage E, the bar N, the lever M actuated thereby, the spindle *i*, having a spring, *i'*, and a collar, i^2, connected to said lever M, the cam-lever W, and projections on the carriage for actuating said lever, as specified.

16. The combination of the spring-actuated spindle *i* of the work-holder, the lever P, having a spring-bolt, *t*, the frame D, having a projection, *t'*, the carriage E, having cams t^3, and connections between the lever P and the spindle *i*, as set forth.

17. The combination of the spring-actuated spindle *i* of the work-holder, the lever P, having a beveled end, a spring-bolt, *t*, with stem t^2, the frame D, having a projection, *t'*, the carriage E, having cams t^3 and lugs or projections t^4, and connections between the said lever P and spindle *i*, as described.

18. The combination of the spring-actuated spindle *i* of the work-holder, the lever P, having pins *s'*, locking and releasing devices for said lever, the carriage E, having projections, as described, the bar N, having notches *s*, the cam-lever W for actuating said bar, and the lever M, connected to the bar and to the spindle *i*, as specified.

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

JACOB SCHLACHTER.

Witnesses:

JAMES F. TOBIN,

HARRY SMITH.