No. 696,467. Patented Apr. 1, 1902.

F. R. McBERTY.

GLASS WORKING MACHINE.

(Application filed July 15, 1898.)

(No Model.)

3 Sheets—Sheet 1.

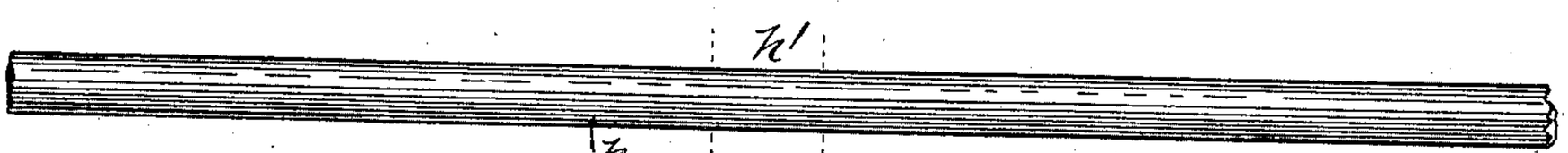


Fig. 1.

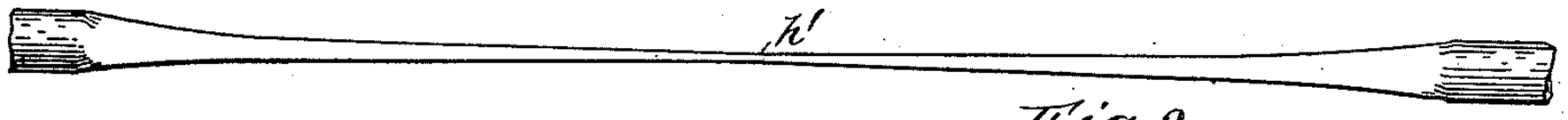
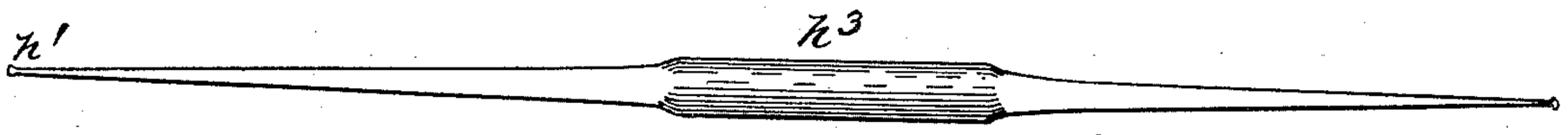


Fig. 2.



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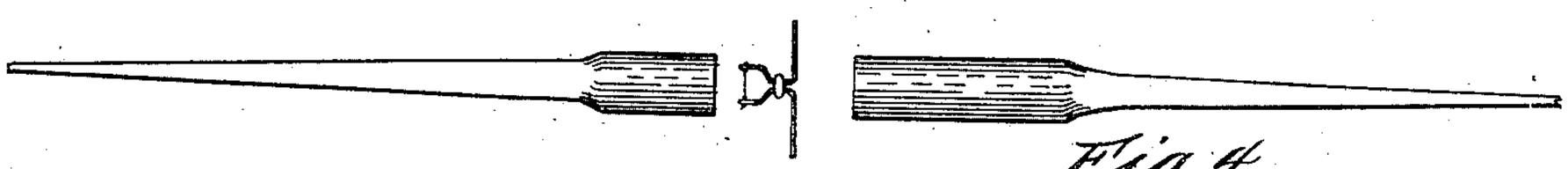

Fig. 4.

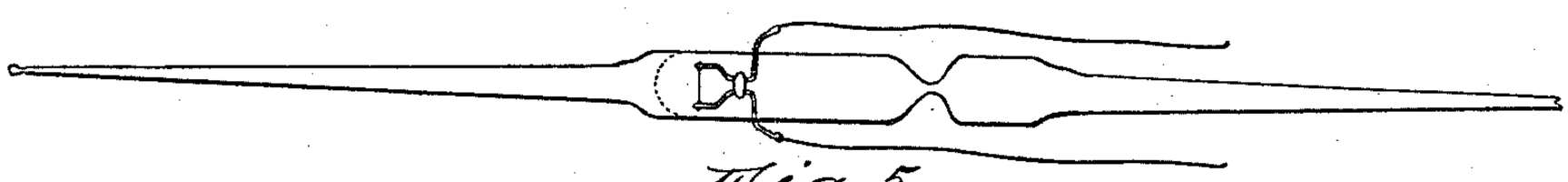

Fig. 5

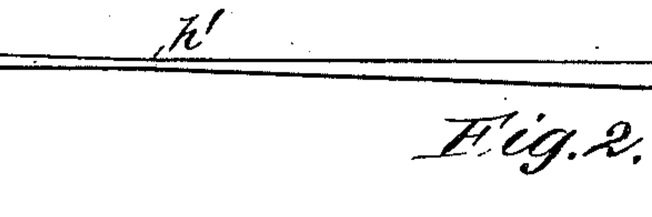

Fig. 6.

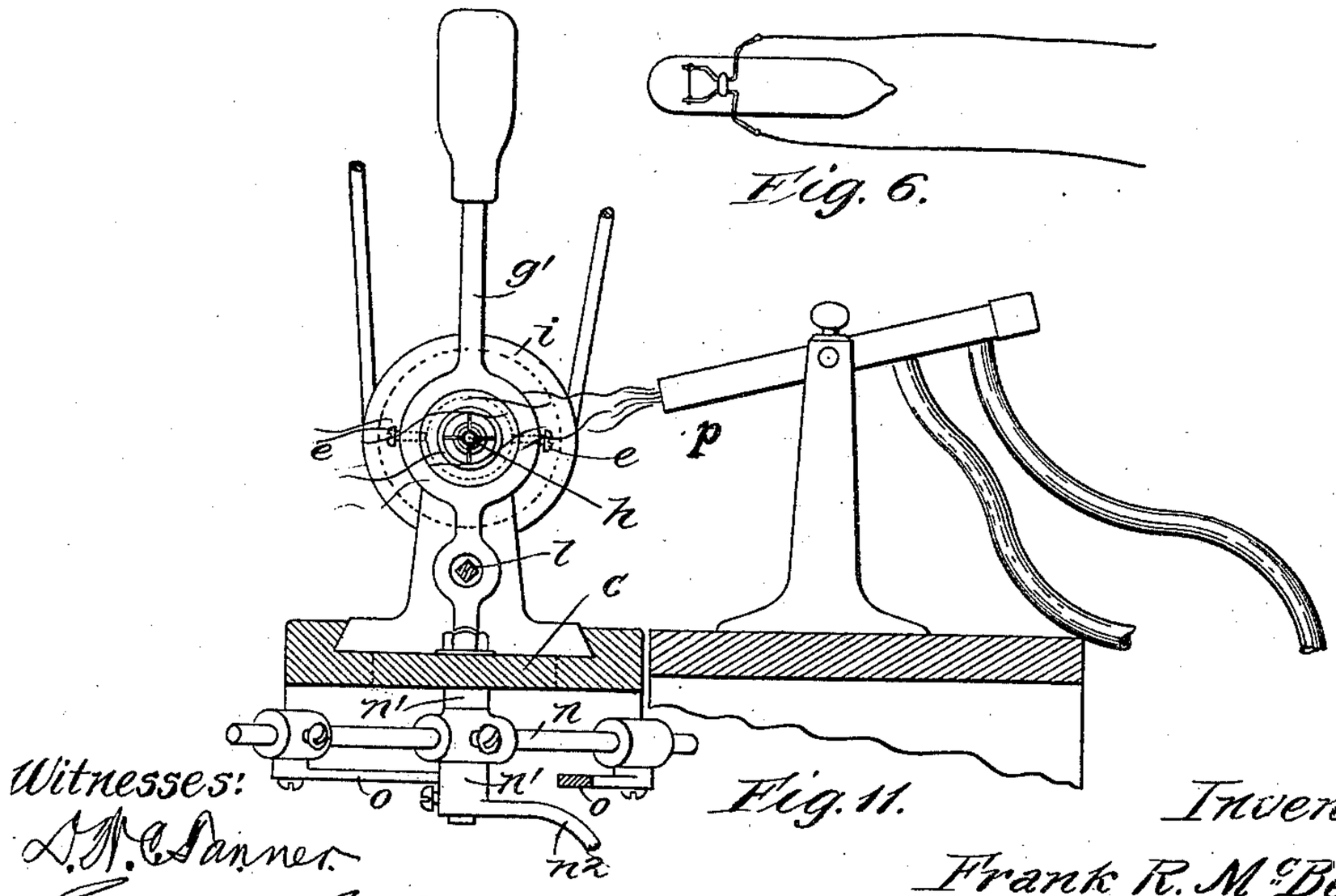

Fig. 11.

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GLASS WORKING MACHINE.

(Application filed July 15, 1898.)

(No Model.) 3 Sheets—Sheet 2.

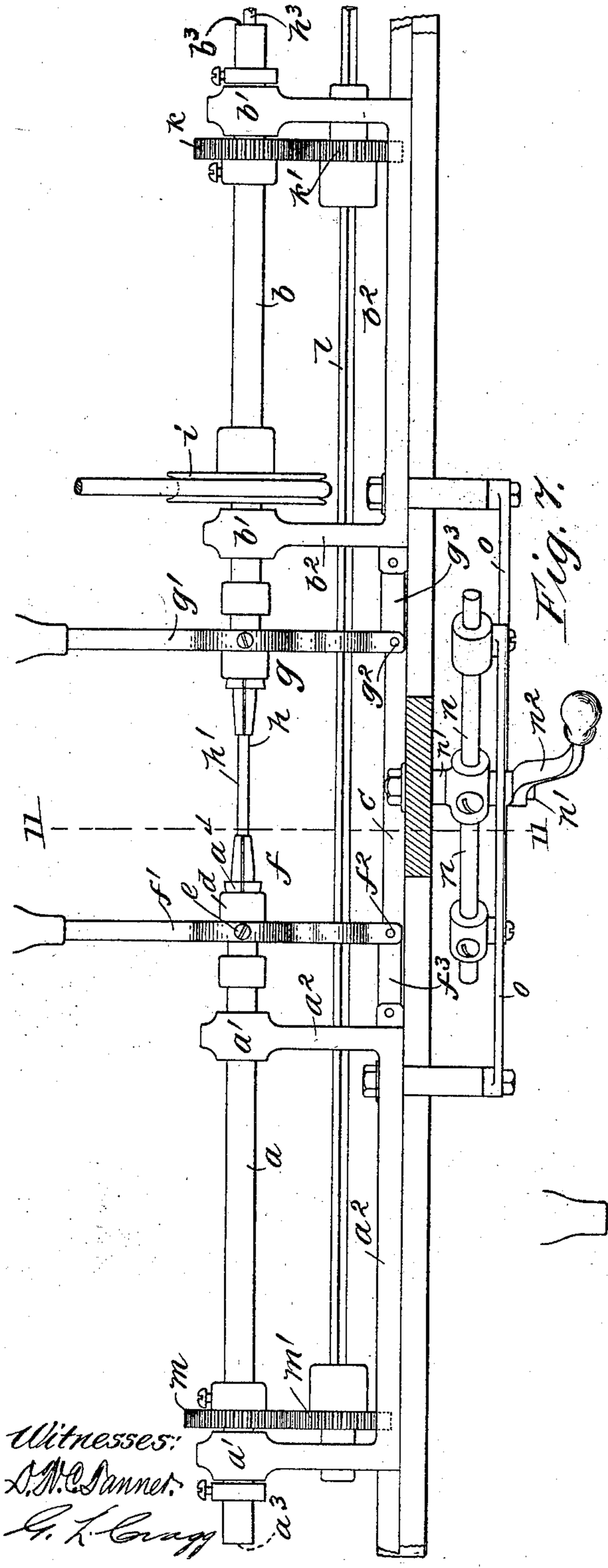

Fig. 7.

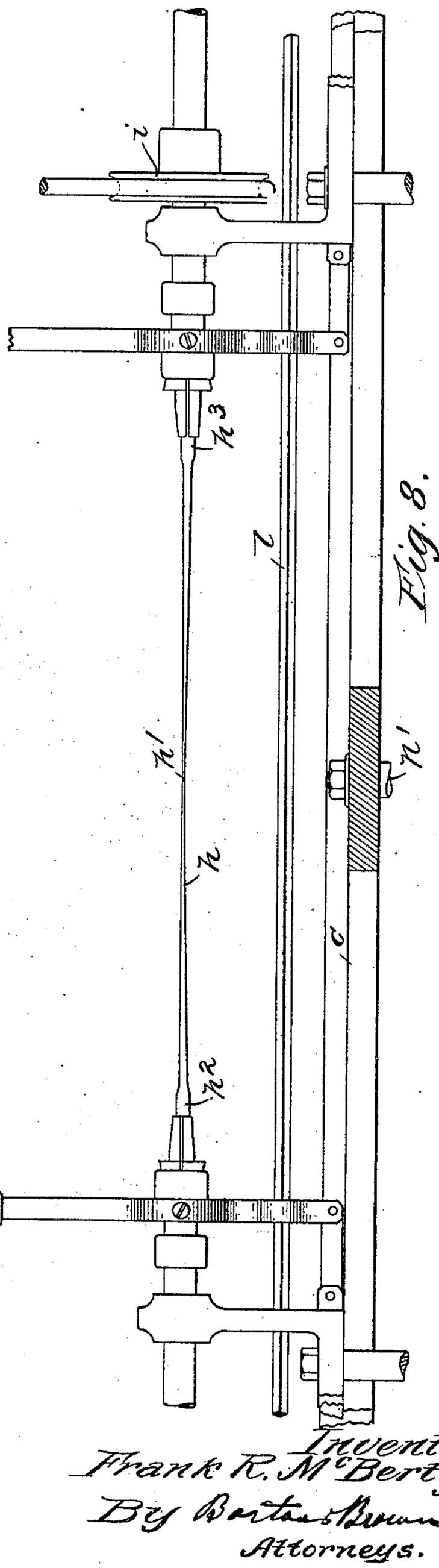

Fig. 8.

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GLASS WORKING MACHINE.

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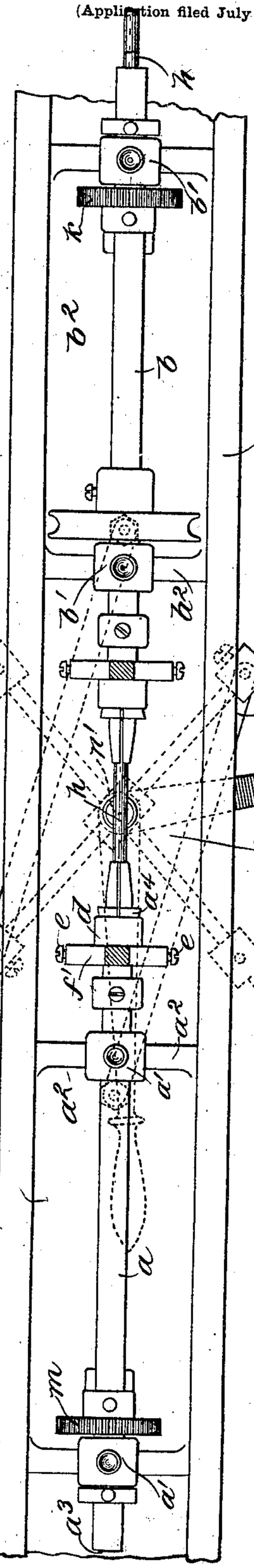

Fig. 9.

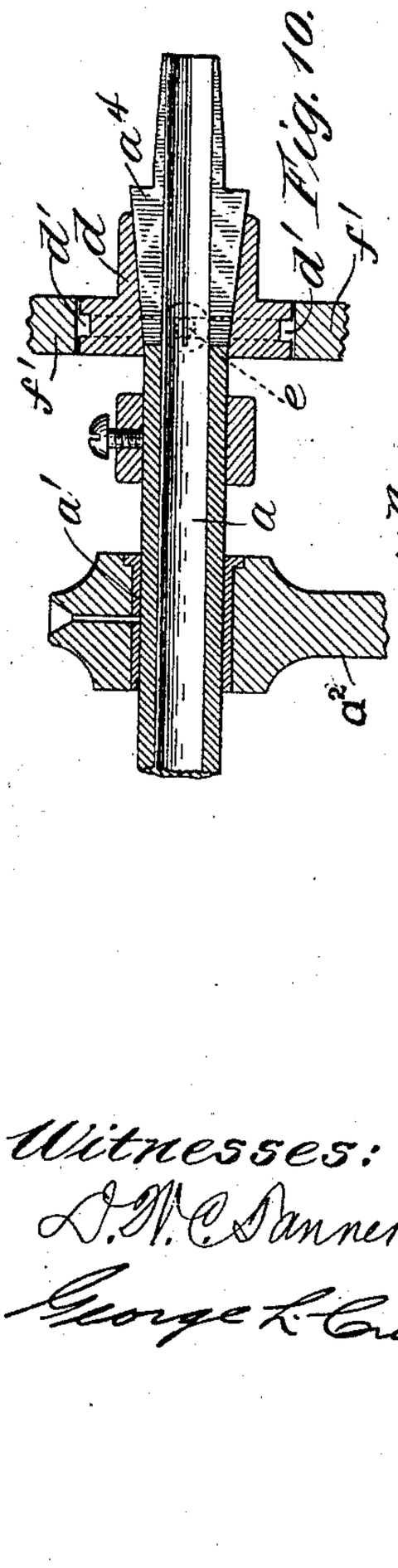

Fig. 10.

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UNITED STATES PATENT OFFICE.

FRANK R. McBERTY, OF EVANSTON, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

GLASS-WORKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 696,467, dated April 1, 1902.

Application filed July 15, 1898. Serial No. 686,009. (No model.)

To all whom it may concern:

Be it known that I, FRANK R. McBERTY, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Glass-Working Machines, (Case No. 73,) of which the following is a full, clear, concise, and exact description.

My invention relates to a glass-working machine, and more particularly to a machine adapted to assist in the manufacture of miniature incandescent lamps. These lamps, which are at present in extensive use for signaling purposes in telephone-exchanges, are most easily made from glass tubing by a process whose successive steps may be briefly described as follows: The tubing is heated for a short distance, and to do this uniformly it is carefully rotated by the operator while the flame is directed on one spot. As soon as the tubing is brought to the required temperature it is drawn out very thin and finally melted in two at the thinnest point. The operation is thereupon repeated at a point farther along, so that a double-ended piece is thus removed from the main length of tubing, such piece consisting of a section of tubing having the central portion thereof for a distance of about an inch and a half of normal diameter and the ends tapering to points, each tapered end being several inches in length. These double-ended pieces are known among glass-workers by the name of "points." Each point is then cut in two and the lamp-filament sealed in, the parts thereupon being welded together again, one end of the point rounded off to form the bulb of the lamp and the other end drawn down to the shape of the base, so that after the air has been exhausted and the base sealed the lamp is completed.

Heretofore the first as well as the finishing steps of the above-described process have necessarily been performed by a skilled glass-worker, and it has been my purpose to produce a machine for making points of uniform size and shape more quickly and easily than was possible by hand, such machine being extremely simple in construction and operation, so as to permit of its use by an ordinary workman, thereby saving the time of the skilled glass-blower.

My invention consists, therefore, in a machine having a pair of chucks adapted to hold a length of glass tubing, means for rotating said chucks at the same speed in a uniform direction, means for heating the tubing at a point between the chucks while it is rotated by said chucks, and means for causing a relative longitudinal reciprocatory movement between said chucks, such relative movement being preferably effected by causing said chucks simultaneously to recede from one another to draw out the tubing and to approach one another to permit a second length of the tubing to be similarly operated upon, thereby to produce the double-ended point.

My invention will be more particularly described by reference to the accompanying drawings, in which—

Figures 1 to 6, inclusive, illustrate the several successive steps of the process of lamp-making above described. Fig. 1 shows simply a length of glass tubing and indicates in dotted lines the area thereof upon which the blowpipe-flame is directed. Fig. 2 shows this heated portion drawn out thin and ready to be melted in two by another application of heat. Fig. 3 shows a completed point. Figs. 4, 5, and 6 illustrate the transformation of the point into an incandescent lamp—that is, the "sealing in" of the filament and shaping of the ends of the lamp. Fig. 7 is an elevation of a glass-working machine constructed in accordance with my invention. Fig. 8 is a similar view, the parts being shown in an alternative position. Fig. 9 is a plan view thereof. Fig. 10 is a longitudinal sectional view of one of the chucks, and Fig. 11 is a cross-sectional view on line 11 11 of Fig. 7.

Similar letters of reference are used to designate the same parts wherever they are shown.

The spindles *a b* are mounted to rotate in bearings *a' a' b' b'*, provided in the stocks a^2 b^2, respectively, which stocks are mounted upon the bed *c* of the machine and are movable longitudinally thereon. As shown most clearly in Fig. 10, the spindle *a* is enlarged at its end a^4 and tapered, said tapered portion being adapted to be engaged by an annular clutch *d*, which encircles the spindle and is movable longitudinally thereon. The end of

the spindle is slotted to form spring-like jaws, and when the annular clutch d is forced outward on the tapered portion a^4 these spring-like jaws are forced together to hold anything which may be inserted between them. To effect the movement of the clutching-ring d, I provide an annular slot d' therein, which slot is adapted to be engaged by the ends of pins $e\,e$, mounted upon the encircling clutch-lever f'.

Referring to Fig. 7, it will be easily understood that when the clutch-lever f' is moved to the right or toward the end of the spindle the ring-clutch d will be forced along the tapered portion a^4 of the spindle and will cause the spring-like jaws thereof to be forced together. An opposite movement of the clutch-lever will permit the jaws to assume their normal or open positions. The whole arrangement above described may be considered as a chuck f, mounted upon the end of the hollow spindle a. A similar chuck, which may be designated as a whole by the letter g, is provided in connection with the hollow spindle b, this chuck being operated by a clutch-lever g', similar to the clutch-lever f'. The ends f^2 g^2 of the clutch-levers are pivoted, through the medium of links f^3 g^3, to the stocks a^2 b^2. The spindle b is continuously rotated by means of a belt passing around the pulley i. A pinion k is mounted to rotate with the spindle b and meshes with a pinion k', mounted to rotate with, but movable longitudinally along the square shaft l. The shaft l is journaled to rotate in bearings provided in the stocks a^2 b^2, but is movable longitudinally in its bearing in the stock b^2. The shaft carries a pinion m' at the stock a^2, which meshes with a pinion m, mounted upon the hollow spindle a, so that the spindles a and b are thus caused to rotate together in the same direction and at the same speed by the rotation of the pulley i.

To enable the operator to cause the stocks a^2 and b^2 to move longitudinally along the bed c of the machine approaching or receding from one another, I provide a rocking lever n underneath the bed of the machine, said rocking lever being connected with the stocks a^2 b^2 by links $o\,o$. A manual operating-lever n^2 is associated with said rocking lever.

Upon glancing at Fig. 9 it will be understood that upon moving the manual lever n^2 from the position shown in full lines to the position shown in dotted lines the stocks a^2 and b^2 will be caused simultaneously to recede from one another; but the spindles a and b will continue to rotate as before, since the pinion k' slides along the square shaft l, but still imparts rotation thereto.

Having particularly set forth the details of construction of the machine, I will now proceed to describe its operation.

A length of glass tubing h as long as may conveniently be handled is inserted in the hollow spindle b at its end b^3 and pushed clear through and across into the open chuck f of the spindle a. The levers f' and g' are now operated to cause the chucks to grasp and hold the glass tubing, and while the latter is being rotated a jet of flame from the blow-pipe p is directed against the tubing at the point h'. When the latter has been heated sufficiently to become ductile, the operator grasps the lever n^2 and throws it around, rocking the lever n about its pivot n' and causing the stocks a^2 b^2 to move along the bed c, receding from one another, and since the tubing is held tightly by the chucks f and g it will be drawn out very thin, assuming the shape indicated in Figs. 2 and 8. Thereupon the flame (which has been reduced during the drawing operation) will again be directed on the spot h', and the tubing will be melted in two at this point. The chuck may now be operated by the levers f' g' to release their hold upon the tubing, and the part h^2 should then be pushed on through the hollow spindle and out at the end a^3 thereof, while the part h^3 should be pushed on within the spindle b and inserted in the hollow spindle a. The operator now tightens the chucks and another part of the tubing is drawn out, so that the part h^3 now has both its ends drawn thin and assumes the shape of Fig. 3. The point is thus completed. Point after point may be made in this way very rapidly, and the operation is so simple that very little skill is required on the part of the workman who manipulates the machine.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent, together with all such modifications and adaptations as may be made with mere skill, the following:

1. The combination in a glass-working machine, of a hollow spindle and a chuck having jaws carried upon the end of said spindle, said spindle being adapted to receive an indefinite length of straight glass tubing through its open end, and permitting the tubing to be thrust through the bore of the spindle and protrude through the jaws of the chuck, the jaws of the chuck being adapted to engage and hold the tubing, a second chuck in alinement with the first, adapted to hold the end of the tubing which protrudes from the first-mentioned chuck, means for rotating the chucks at equal speeds in the same direction, a gas-jet for heating the glass tubing at a point between the two chucks, and means for causing relative longitudinal movement between the chucks, whereby the glass tubing is drawn out, as described.

2. In combination, in a glass-working machine, two hollow rotatable spindles in alinement with one another, adapted to receive straight glass tubing of indefinite length, fed through said spindles from end to end, a chuck carried by each spindle, each of said chucks having jaws adapted to grasp the tubing a gear on each spindle and a pinion for each gear longitudinally movable on a shaft having a spline engaging said pinions, means

for driving said shaft, a gas-jet directed upon the glass tubing between the two spindles, and mechanism for causing a relative longitudinal movement of the chucks, whereby the tubing is drawn out, as described.

3. The combination with the longitudinally-movable stocks and the hollow spindles journaled therein, said spindles being in alinement and adapted to receive straight glass tubing of indefinite length, fed through said spindles from end to end, the gears on the spindles and the pinions meshing into said gears on a splined shaft, and means for rotating said spindles, of the chucks carried by the hollow spindles, the gas-jet carried between said chucks, the lever n^2 and the links o connecting said lever with the stocks carrying the chucks, as described.

In witness whereof I hereunto subscribe my name this 21st day of June, A. D. 1898.

FRANK R. McBERTY.

Witnesses:

GEORGE L. CRAGG,

D. W. C. TANNER.