

A. D. LAWS.

Machines for Tapping Gas and Water-Fittings.

No. 143,168.

Patented September 23, 1873.

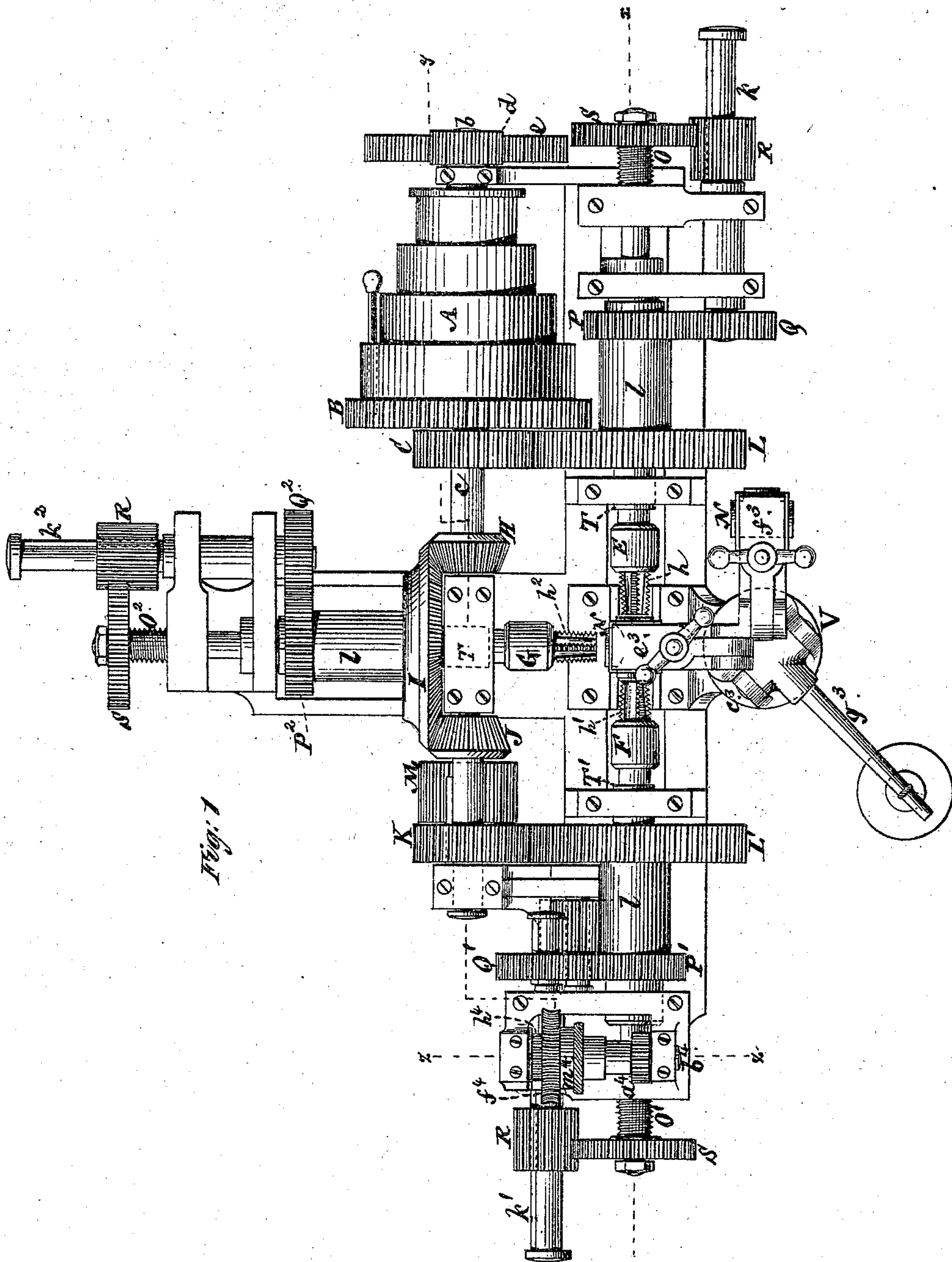


Fig. 1

Witnesses:

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D. M. M. M.

per Albert D. Laws
Brown & Allen
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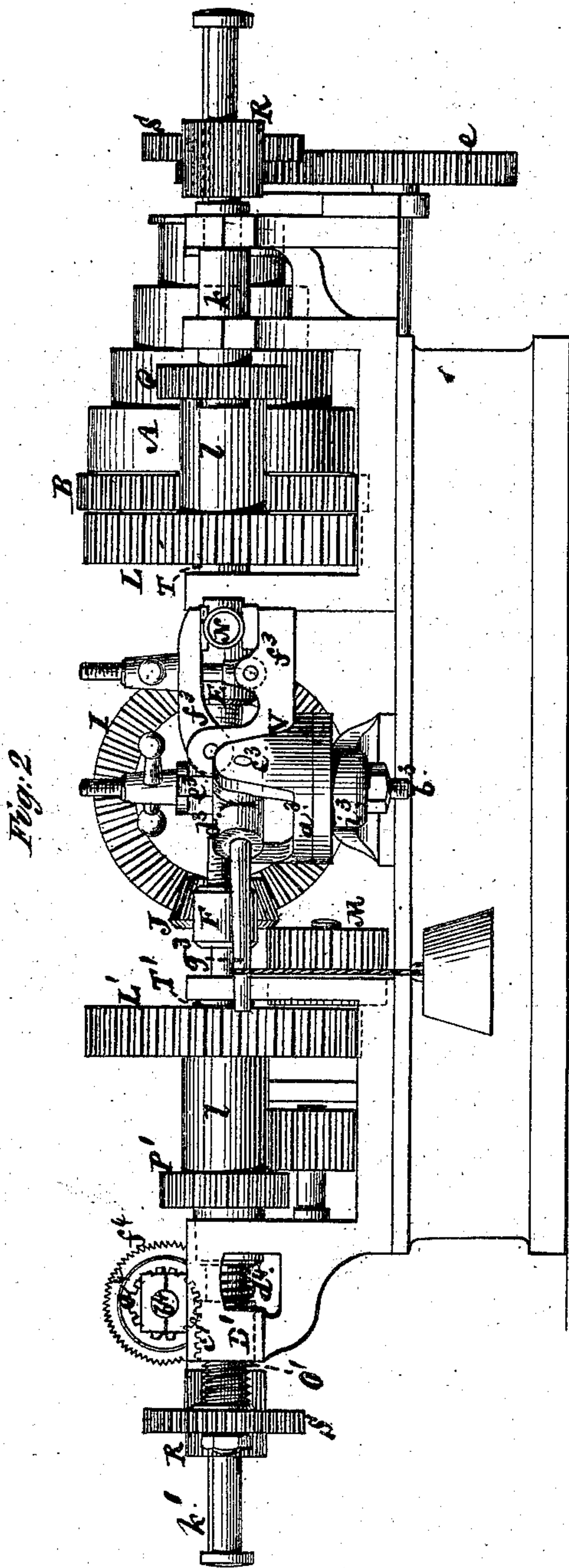


Fig. 2

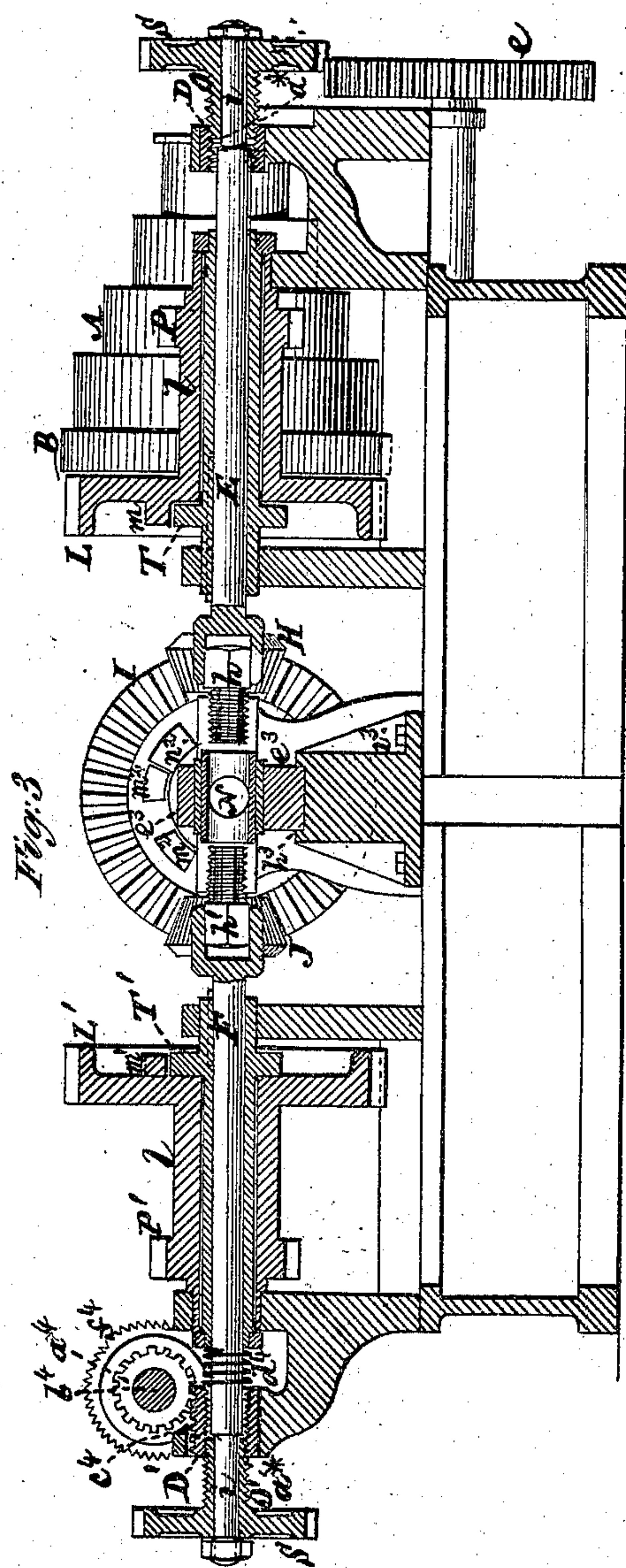


Fig. 3

Witnesses:
Frederick Haynes
D. Russell

Albert D. Laws
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Attorneys

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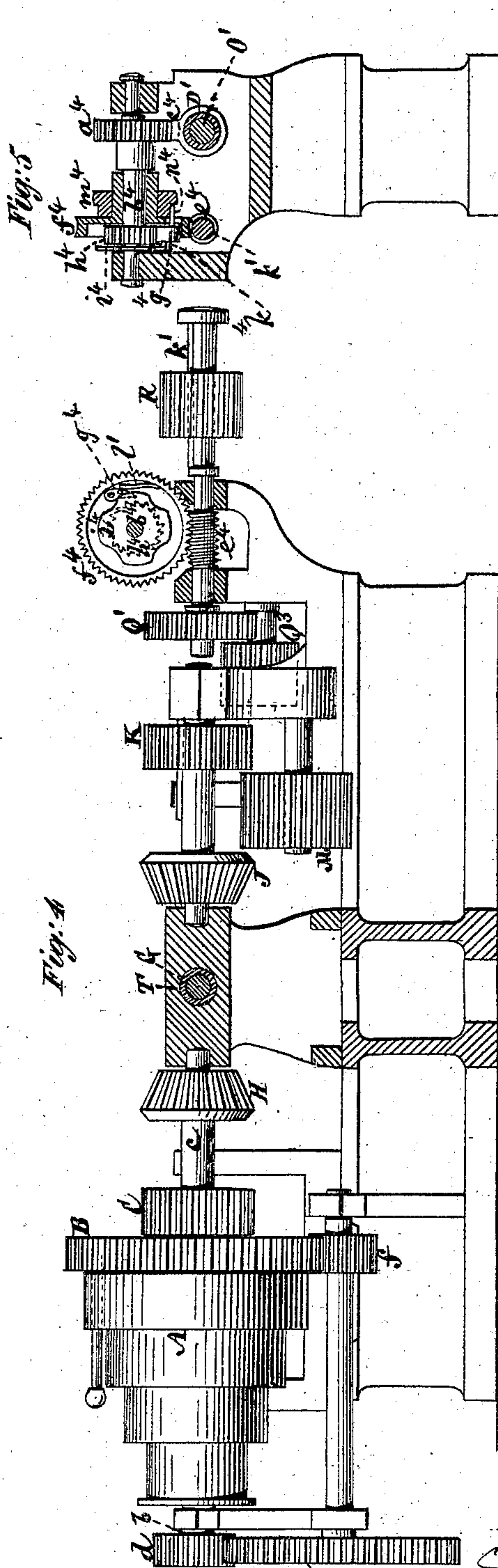


Fig. 5

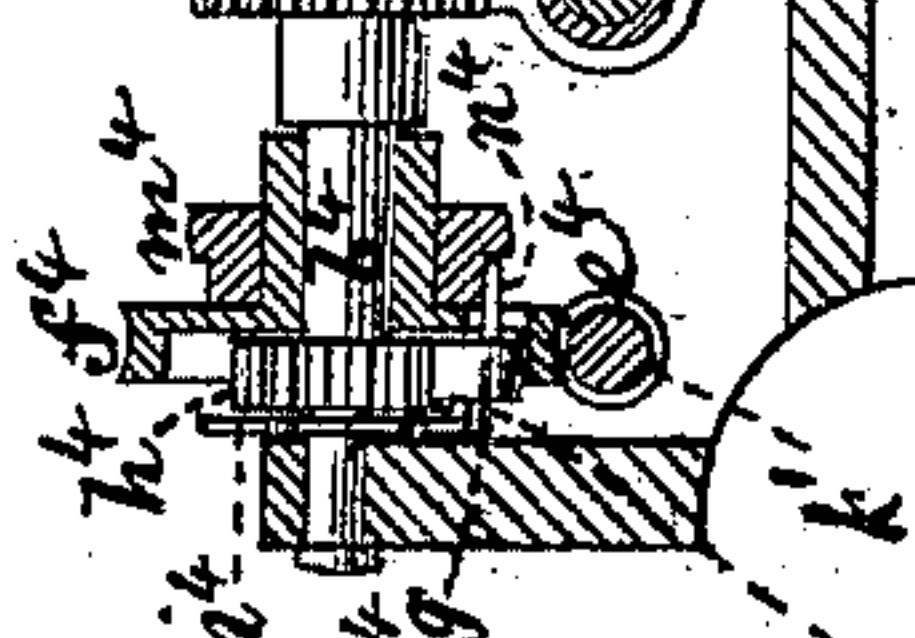


Fig. 4

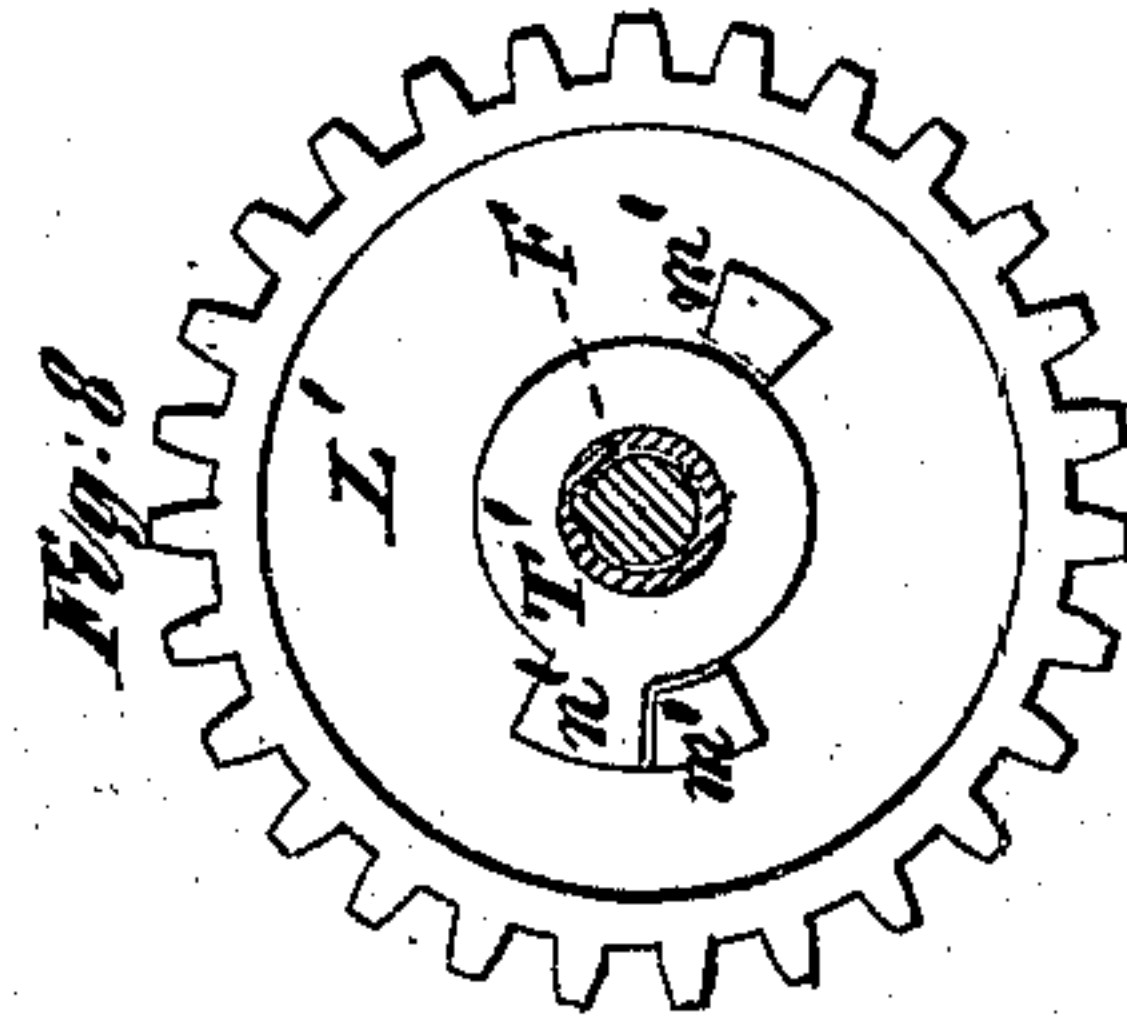


Fig. 8

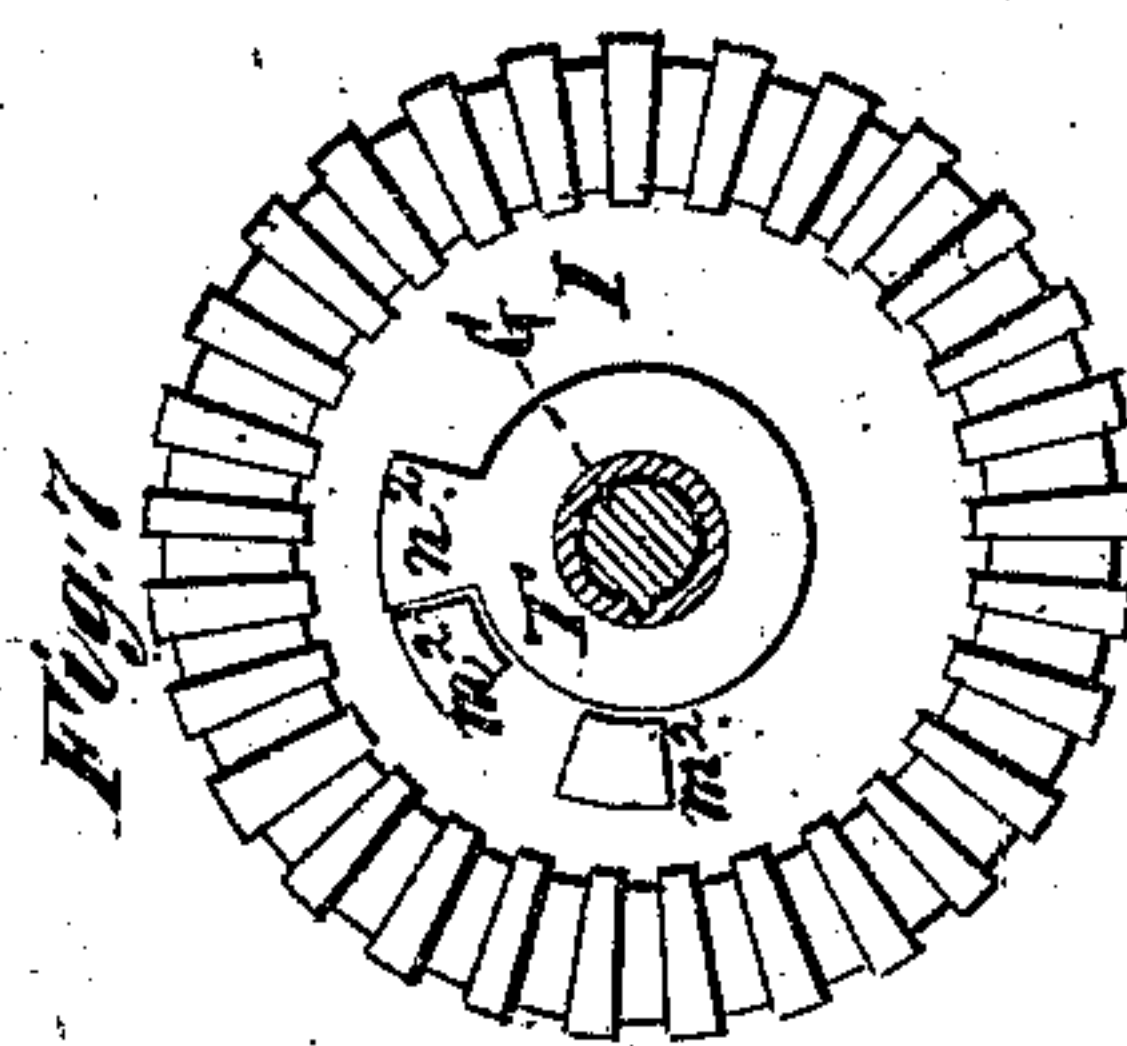


Fig. 7

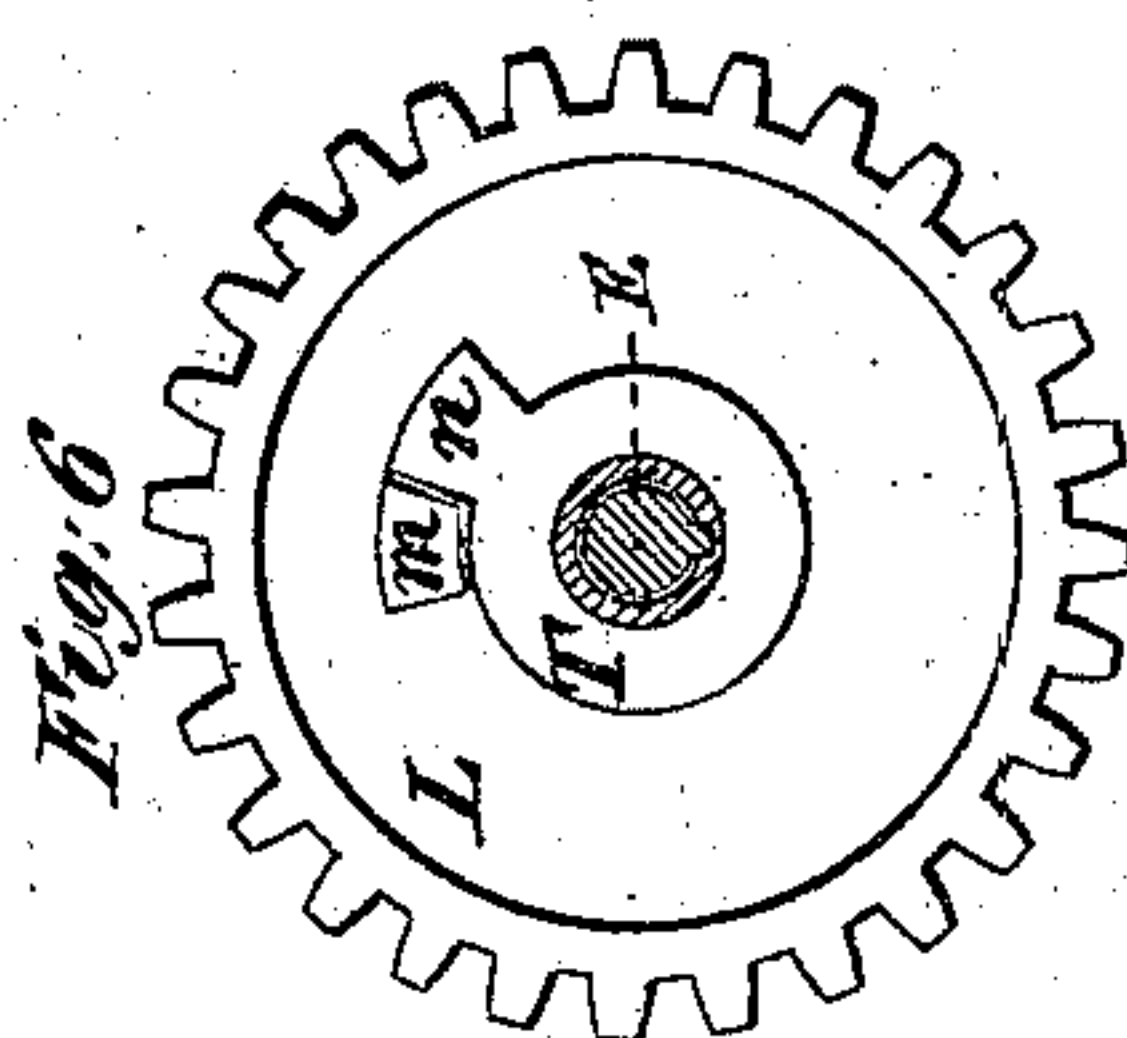


Fig. 6

Witnesses:

Fred Haynes
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UNITED STATES PATENT OFFICE.

ALBERT D. LAWS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE BELKNAP AND BURNHAM MANUFACTURING COMPANY, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR TAPPING GAS AND WATER FITTINGS.

Specification forming part of Letters Patent No. 143,168, dated September 23, 1873; application filed March 15, 1873.

To all whom it may concern:

Be it known that I, ALBERT D. LAWS, of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain Improvements in Machines for Tapping Gas and Water Fittings, of which the following is a specification:

This invention consists in a swinging and swiveling chuck for holding the work, whereby the fittings to be tapped or reamed are readily introduced and adjusted to their places, likewise removed or replaced by other fittings with facility and dispatch. The invention also consists in certain combinations of devices and peculiarities in their construction for taking off strain from the taps when starting or working them backward, to prevent stripping of the threads in the fittings; also, for cutting either a right or left hand thread by one of the taps; likewise, in means whereby the several taps start back at different periods to divide the strain or labor on the machine; also, in means for reaming out the mouths of the fittings.

In the accompanying drawing, which forms part of this specification, Figure 1 represents a plan of a machine having my improvements applied; Fig. 2, a front elevation of the same; Fig. 3, a longitudinal vertical section on the line *x x*; Fig. 4, a like section on the irregular line *y y*; and Fig. 5, a transverse vertical section on the line *z z*. Figs. 6, 7, and 8 are face views of certain clutch devices and wheels operating in connection therewith for rotating the taps.

Similar letters of reference indicate corresponding parts.

A is a cone of differential pulleys, by which motion is communicated to the machine at any desired velocity, and in either direction, as required, from a shaft overhead or otherwise. These pulleys are fast on a shaft, *b*, and are coupled or disconnected, as required, with a spur-wheel, B, fast on a shaft, *c*, the axis of which is coincident with that of the shaft *b*. When the wheel B is connected with the pulleys A their motion is conveyed directly, as it were, from said pulleys, through a pinion, C, on the shaft *c*, to a spur-wheel, L, for the purpose of rotating the tap-stock E with a

given velocity, and of communicating a corresponding velocity to the other tap-stocks F G. When, however, it is required to give less velocity or increased power, then the wheel B is disconnected from the pulleys A, and motion is communicated from said pulleys to said wheel by a back gear, *d, e*, and *f*. The tap-stock F, the axis of which is coincident with that of the stock E, and the tap-stock G, which is at right angles thereto, are rotated by bevel-gears H I J, a pinion, K, and spur-wheel L'. When it is desired to give a reversed rotation to one of the tap-stocks E or F—as, for instance, the latter—to provide for the cutting of a right-hand thread by the tap of the one of said stocks, and a left-hand thread by the tap of the other of said stocks, then the pinion K is slid out of gear with the wheel L' and into gear with a long pinion, M, which in its turn is slid into gear with the wheel L'. This gives a reversed revolving motion to the tap-stock F. Such provision will be found very convenient when, in triple branch gas or water fittings N, such as the machine is adapted to tap, a right-hand thread is required to be cut in the one nozzle or branch of said fitting, and a left-hand thread in the opposite nozzle or branch thereof. The longitudinal movements of the taps *h h¹ h²*, in common with their stocks E F G, is effected by screws O O¹ O² at the outer ends or backs of the tap-stocks E F G, said screws being hollow and fitting freely over a reduced outer portion, *i*, of each stock, between a collar thereon and an outside nut, with a limited amount of lost motion longitudinally, as shown at *a** in Fig. 3, to provide for starting or running back the tap-stocks E F G free from strain on or pressure of the screws, and to accomplish which special means are provided, as herein-after described. The screws O O¹ O² work through boxes D D' in the frame, and are rotated, to give them their requisite forward and backward motions, by means of pinions P P¹ P² on the sleeves of the wheels L I L', said pinions gearing with pinions Q Q¹ Q² on shafts *k k¹ k²*, which carry long or broad faced pinions K, arranged to gear with wheels S on the outer ends of the screws. The sleeves *l* of the wheels L, I, and L' are each fitted loosely upon an in-

ner sleeve, T or T', arranged to surround, and in slotted or feather gear with, the tap-stocks E, F, or G, so as to revolve in common with the latter, but permitting of the necessary longitudinal movement of the tap-stocks forward and backward through them to project the taps into, and to withdraw them from, the work. Rotary motion is communicated from the wheels L, I, and L' to the tap-stocks E F G through the sleeves T T' by means of studs on the faces of said wheels arranged to strike or bear against radial studs on the sleeves for the purpose of driving the latter, such driving stud-gear forming, as it were, a free clutch.

The object of this arrangement or combination of devices is to provide a lost motion in the rotation of the tap-stocks E F G by the wheels L I L', whereby said wheels, in being reversed to unscrew the taps from the fitting, will move a given distance before acting on or driving the sleeves T or T', thereby giving time for the pinions P P¹ P² on the sleeves l of said wheels to work back the screws O O¹ O², or give them their lost motion, as hereinbefore referred to, before setting in motion the tap-stocks. This is a simple mode of meeting or providing for the lost motion in the various gears, and whereby pressure or strain of the screws O O¹ O² on the tap-stocks is taken off the latter when starting or running back the taps, thus avoiding all liability to strip or injure the thread. Furthermore, the studs on the faces of the wheels L I L' and on the sleeves T T' are so arranged that the several tap-stocks are driven to effect their reversal at different periods relatively with each other. This divides the labor or strain upon the machine consequent on starting the taps back, without interfering with their forward run or screwing action on the work by reason of the taps being run farther back than necessary to clear the work, so that when rotating the wheels L I L' in a forward direction again the driving-studs on said wheels will come in contact with the studs on the sleeves T T' in advance of the taps coming up to the work, thus admitting of the several taps commencing to screw simultaneously.

The following arrangement of studs answers the desired ends: Thus the wheel L has but one stud, *m*, and its sleeve T a single stud, *n*, while the wheels I and L' are each provided with two studs, *m*¹ *m*², at different distances from each other—that is, as regards the pair of studs on the one of said wheels relatively to those on the other—so as to operate at different intervals on the studs *n*¹ *n*² of the sleeves T T' of said wheels, whereby the several sleeves T T' of all the tap-stocks are set in motion at different periods. The swinging and swiveling chuck V, used to hold the fitting N, consists of a horizontally-swiveling table or support, *a*³, moving on or around a vertical pivot, *b*³, and constructed to form a jaw, in which is hung, by horizontal pivots *c*³ *c*³, a vertically-swiveling work-holder, *d*³, having duplicate jaw-clamps *e*³ *f*³, arranged to project at right

angles to each other, and each serving to hold a fitting, N. By means of this swinging and swiveling chuck, which is operated by means of a handle or lever, *g*³, that should be weighted to counterbalance the work, a fitting, N, may readily be introduced within the machine, or placed in proper relation with the several taps, and after the screw-threads have been cut and the taps withdrawn such fitting be as readily shifted out of the way for removal from its clamp *e*³ or *f*³ by simply bearing down on the handle *g*³ to swing the clamps upward so as to clear the tap-stocks, and then swiveling, by said handle, the support *a*³ on its vertical pivot *b*³, to adjust the finished fitting to one side and simultaneously, or by such action, and afterward ceasing to depress the handle *g*³, serving to put another or new fitting into position for action on it of the several taps, either clamp *e*³ or *f*³ alternately occupying the portion represented for each one in Fig. 1, and whereby a finished fitting may be removed from and a new one or blank be introduced into the clamp occupying an outer position, while the fitting carried by the clamp occupying an inner position is being tapped or operated upon, thus saving time in cases where a number of fittings are required to be tapped. Either clamp *e*³ or *f*³, when adjusted into position for action of the taps on the fitting carried by it, drops into a recess, *h*³, in the stand *i*³ of the swinging and swiveling chuck to hold the latter and work it contains steady.

When it is required to ream out the mouths of the fittings N by inserting reaming-tools, in place of the taps *h* *h*¹ *h*², in the tap-stocks E F G, as frequently necessary, to facilitate entry of the screwed ends of the pipes in the fittings, then it is desirable to employ a quicker and different motion for the longitudinal movement of the stocks E F G than is attainable by the screws O O¹ O². To this end, as shown applied to the stock F, although equally applicable to all the tap or tool stocks, the box D', through which the screw O¹ works, is fitted to slide longitudinally in the portion of the frame which carries it, and a pinion, *a*⁴, on a cross-shaft, *b*⁴, arranged to gear with a rack, *c*⁴, on the box D', said rack being substituted for the screw O¹ as regards the forward projection of the rotating stock F, while a spring, *d*⁴, operates, through the intervention of the screw-box D' and screw O¹, to throw or slide the stock F back after the mouth of the fitting N has been reamed.

When it is required to substitute the rack *c*⁴ for the screw O¹, which motion may, if preferred, be applied to tapping as well as to reaming, then the pinion R on the spindle K' is slid out of gear with the wheel S of the screw O¹, and motion communicated, by a screw, *e*⁴, on the rotating spindle K', to a worm-wheel, *f*⁴. This worm-wheel is fitted loosely on the cross-shaft *b*⁴, but is arranged to connect with said shaft by or through the intervention of a pawl, *g*⁴, carried by the wheel *f*⁴ and a pinion or ratchet wheel, *h*⁴, fast on the

shaft b^4 , and with which the pawl gears, or is made to gear, when it is necessary to project the stock F forward.

It will be evident that, so long as the pawl g^4 is in gear with the wheel h^4 , then the rotation of the wheel f^4 by the screw e^4 will cause the pinion a^4 , acting on the rack c^4 , to project the screw-box D' and stock F forward; but on freeing the pawl g^4 from the wheel h^4 , then the spring d^4 throws back the stock F. This forms a simple and quick motion for reaming the work and afterward retiring the reamer.

An automatic device consisting of a many-leaved cam, i^4 , and pin n^4 on the revolving pawl traveling over said cam, and kept in contact therewith by the action of a spring, l' , applied to the pawl, may serve to throw the pawl in or out of gear with the wheel h^4 at fixed intervals, to give the necessary action or length of stroke to the reamer, and time to change fittings.

There is also a sliding pawl, shifter, or unshipper of the rack-motion when it is required to rotate the screw O^1 , to give longitudinal motion to the tap-stock F, said means consisting of a ring, m^4 , fitted to slide longitudinally on the hub of the worm-wheel f^4 , and constructed so that, when slid toward said wheel, it acts upon a pin, n^4 , of the pawl to keep the latter out of gear with the wheel h^4 ; but when slid away from said wheel, then the pawl is free to engage with the wheel h^4 . Q^3 is a long sliding pinion, which may be adjusted to engage with the pinion P^1 in place of the pinion Q^1 , which latter is then slid to engage merely with the pinion Q^3 , for the purpose of reversing the motion of the spindle K' when required.

What I claim, and desire to secure by Letters Patent, is—

1. The swinging and swiveling chuck V, provided with work-holding clamps $e^3 f^3$, arranged in relation with each other, for operation in connection with the tap-stocks E F G, substantially as specified.

2. The combination, with the tap-stocks E F G, arranged in relation with each other as described, of the sliding pinions K M and wheel L', essentially as and for the purpose herein set forth.

3. The combination, with either tap-stock E, F, or G, of the sleeve T or T' in feather gear with said stock, the wheel L, I, or L', with its sleeve l , the driving stud or studs m , m^1 , or m^2 on the face of such wheel, the radial stud n , n^1 , or n^2 on the sleeve T or T', and the hollow screw O, O^1 , or O^2 , arranged to provide for lost motion of the tap-stock in direction of its length, substantially as described.

4. The arrangement of the studs $m m^1 m^2$ on the wheels L, I, and L' in relation with each other and the studs $n n^1 n^2$ on the sleeves T T', whereby the tap-stocks E F G, controlled by said wheels, are rotated at different periods relatively with each other, to effect the reversal of the taps, essentially as described.

5. The combination, with the screw O^1 and tap-stock F, of the sliding screw-box D', the rack c^4 , the pinion a^4 , the worm-wheel f^4 , the screw e^4 , the shifting-pawl g^4 , the wheel h^4 , and the spring d^4 , substantially as and for the purposes herein set forth.

ALBERT D. LAWS.

Witnesses:

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MICHAEL EBERHARD.