(No Model.) 3 Sheets—Sheet 1.

T. G. MORSE.

MACHINE FOR TAPPING METAL PIPES AND FITTINGS.

No. 312,212. Patented Feb. 10, 1885.

Fig. 1.

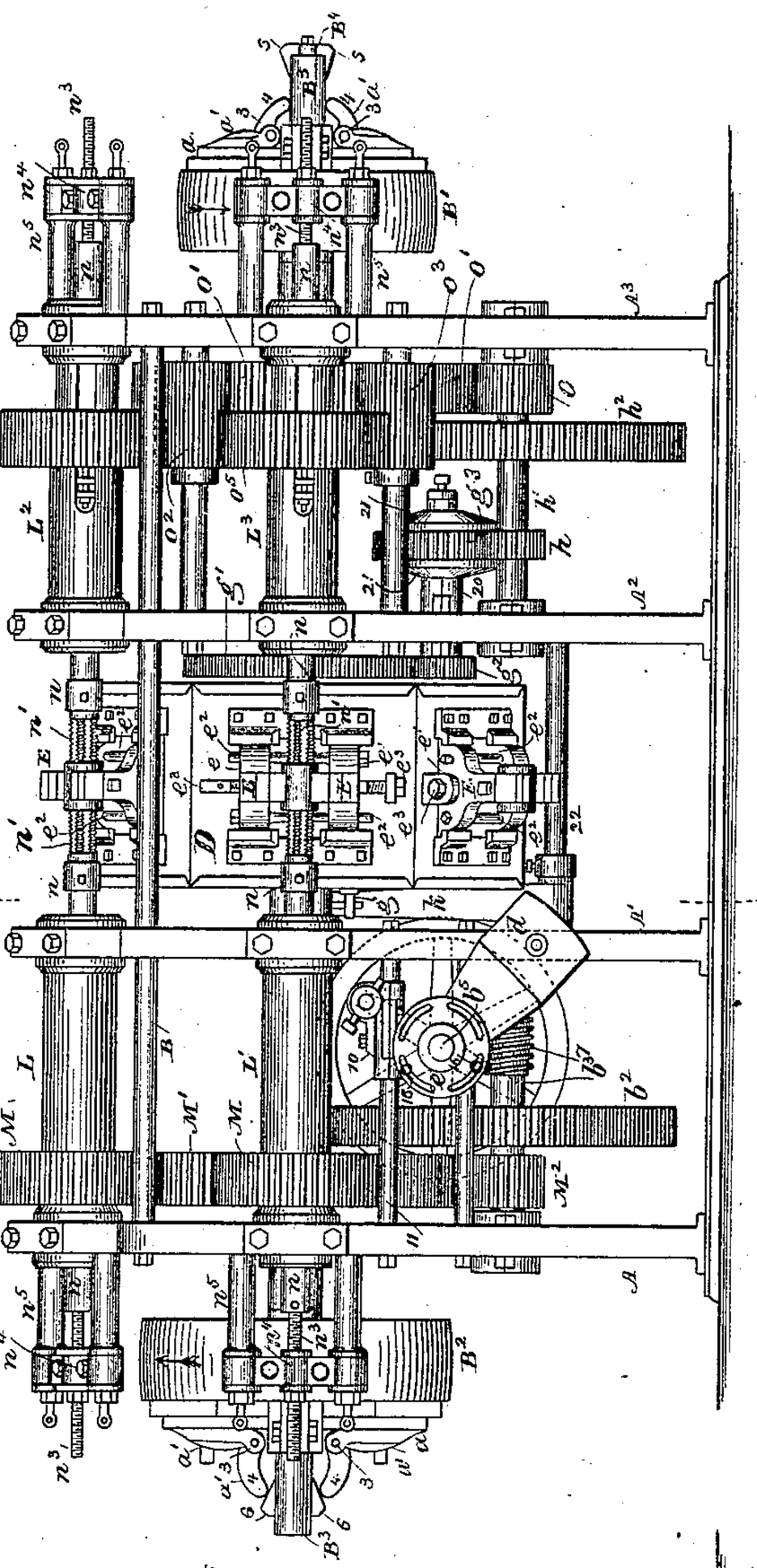


Fig. 8.

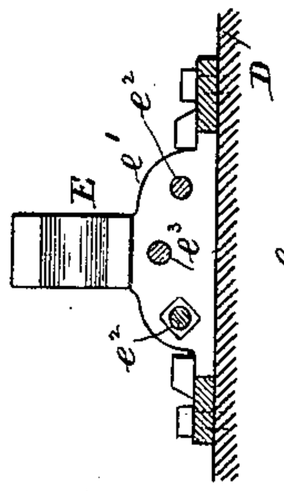
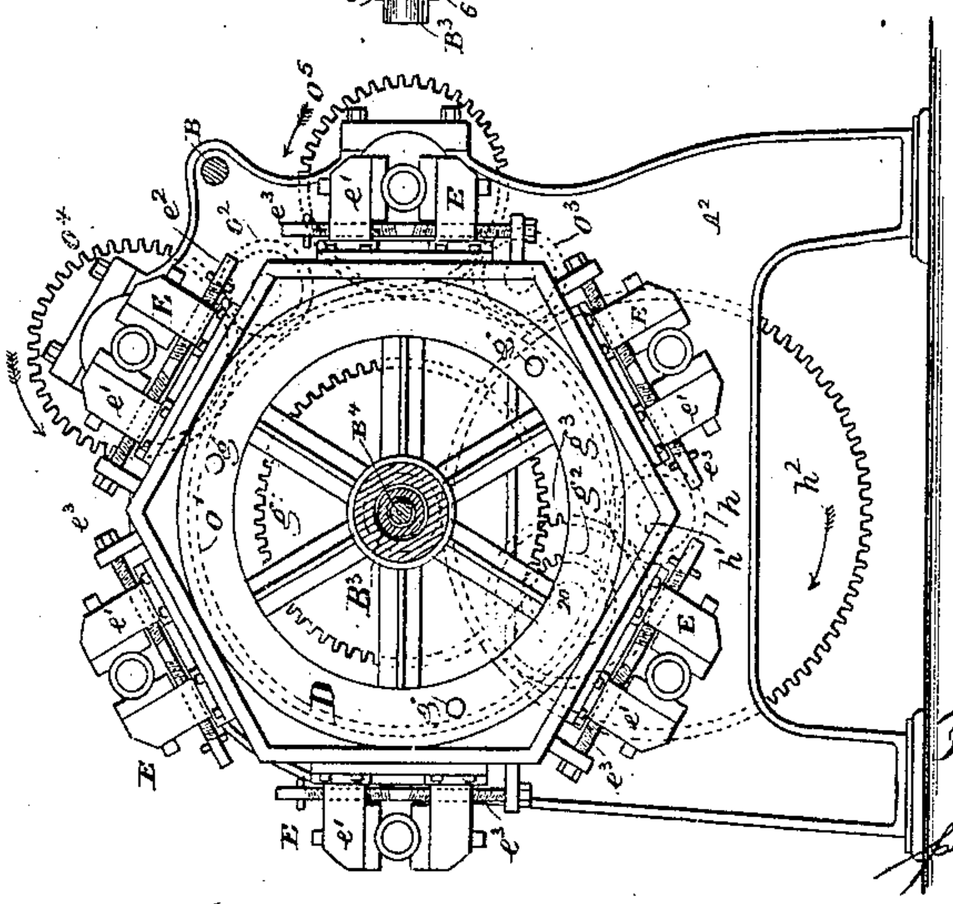


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

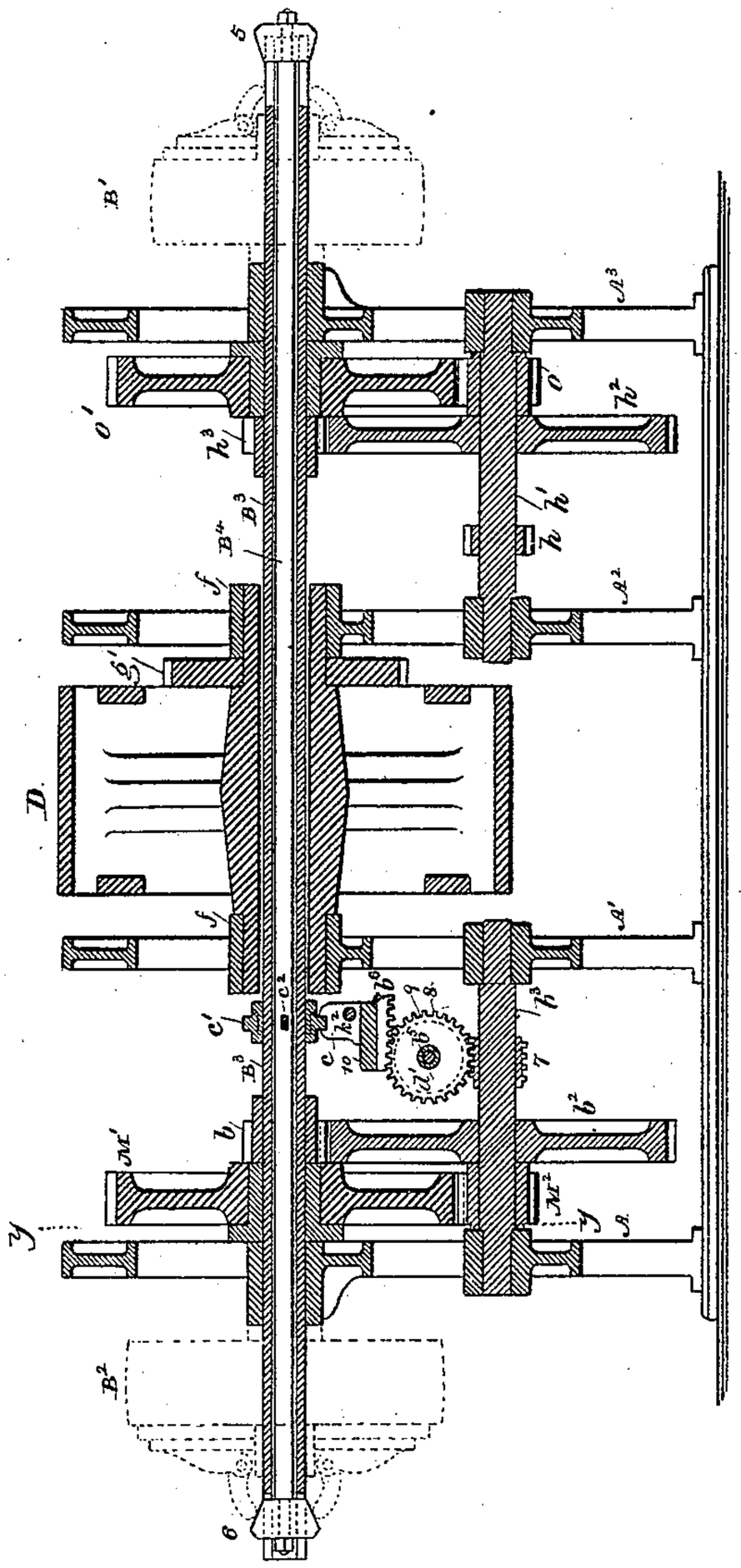

Fig. 11.

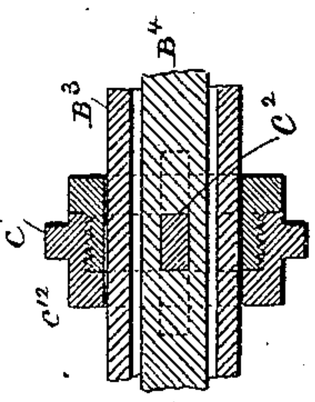

Fig. 10.

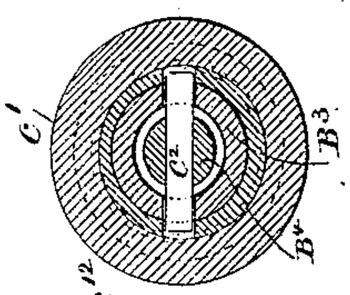

Fig. 9

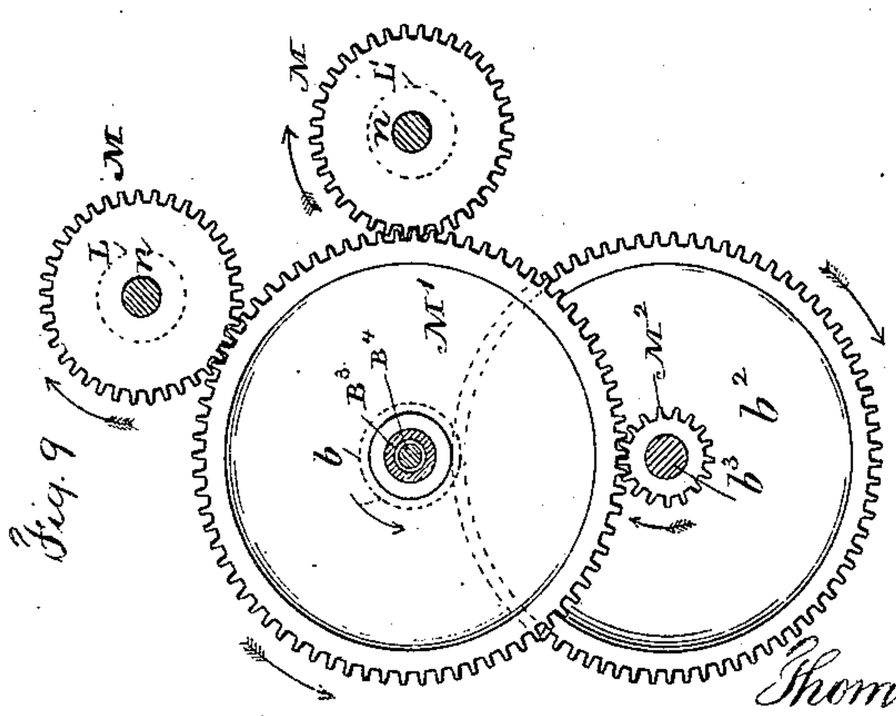

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Fig. 6.

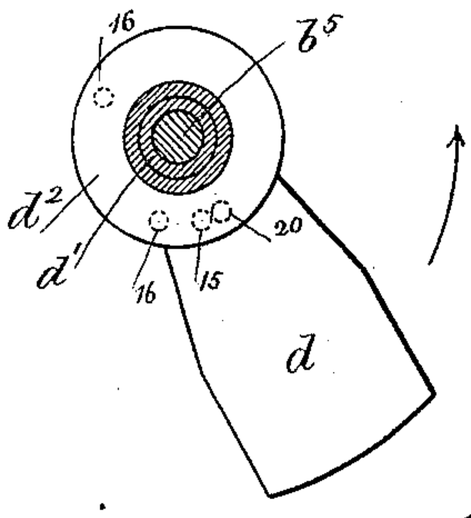


Fig. 7.

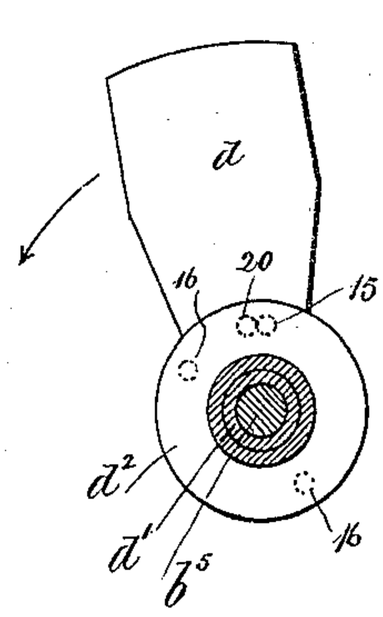


Fig. 4.

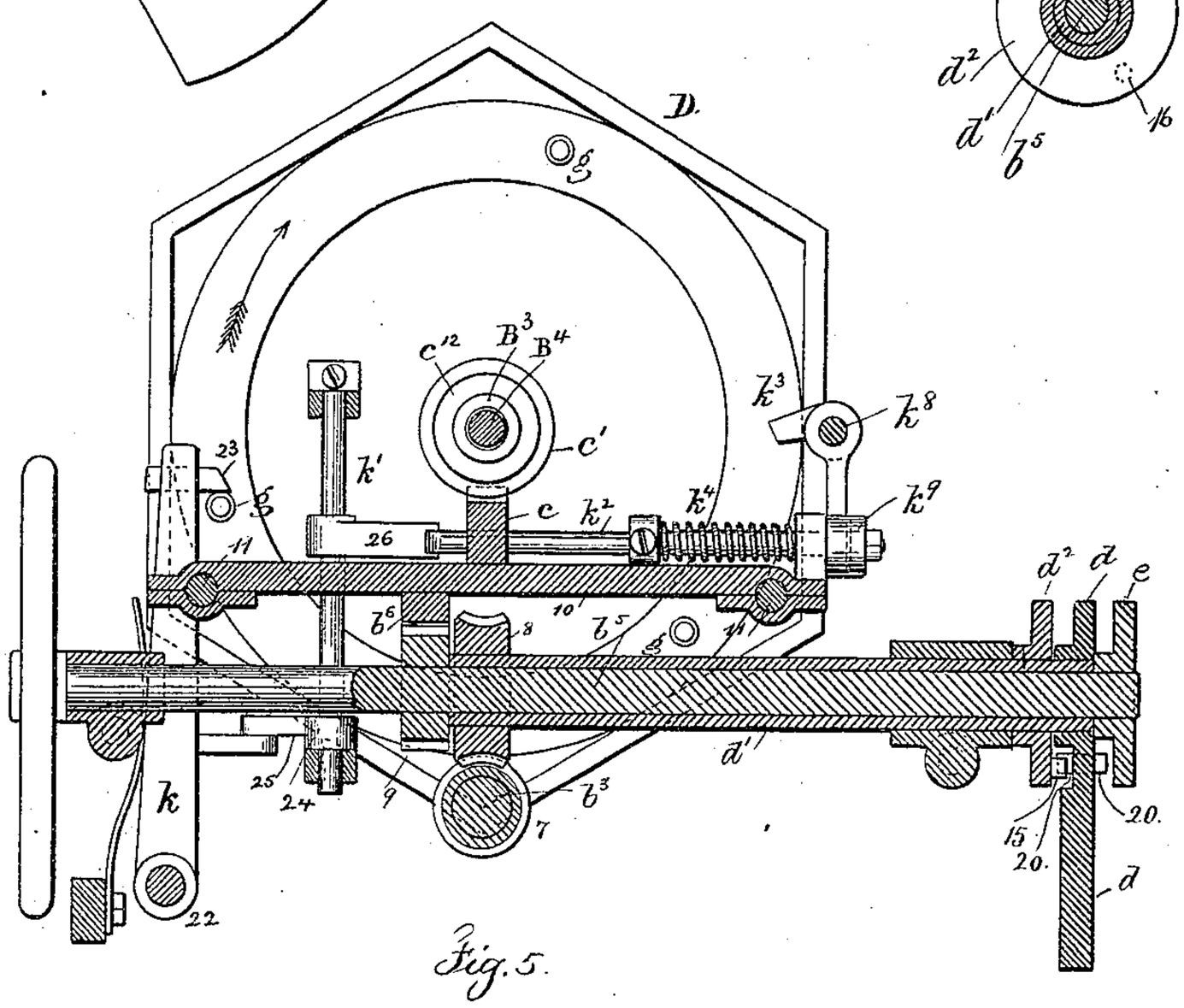
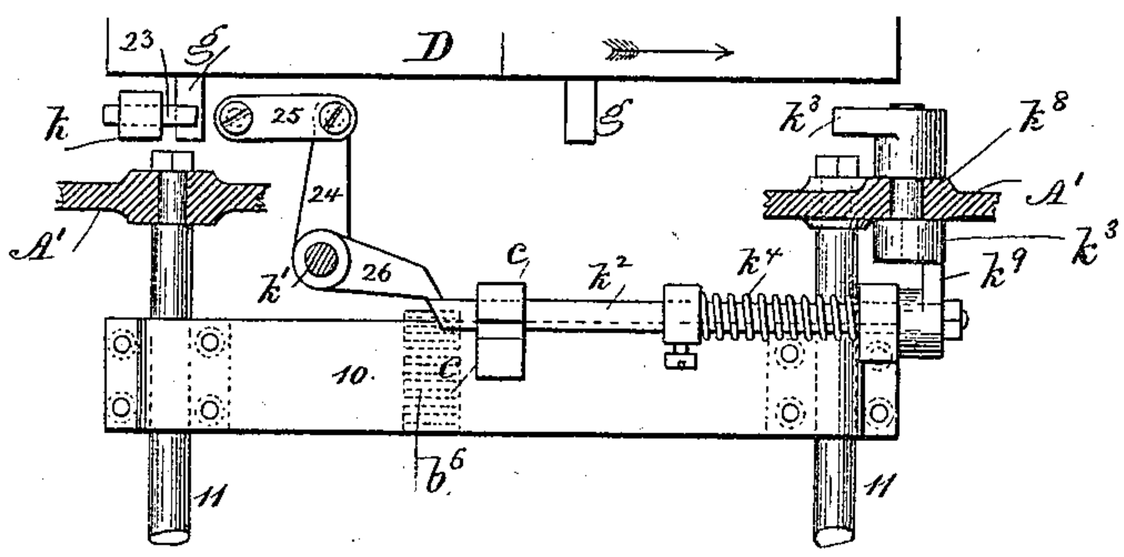


Fig. 5.



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THOMAS G. MORSE, OF ERIE, PENNSYLVANIA.

MACHINE FOR TAPPING METAL PIPES AND FITTINGS.

SPECIFICATION forming part of Letters Patent No. 312,212, dated February 10, 1885.

Application filed January 14, 1884. (No model.)

To all whom it may concern:

Be it known that I, THOMAS G. MORSE, of Erie, in the State of Pennsylvania, have invented an Improvement in Machines for Tapping Metal Pipes and Fittings, of which the following is a specification.

This invention is especially adapted to the cutting of screw-threads within the cast-metal couplings made use of in water and gas pipe fittings.

In my improvement I make use of clamping-vises upon a hexagonal drum, which is rotated progressively, or by a step-by-step movement, in order to present the couplings successively to the action of the screw-taps. During the tapping operation the hexagonal drum holding the vises remains stationary and the taps are brought up from opposite sides. The taps are then revolved in the contrary direction to unscrew them, and the drum is partially rotated to bring another set of tubular couplings into a position to be acted upon. To perform these operations it is necessary that the taps be revolved first in one direction and then the other. It is also necessary to revolve the drum and holding-vises progressively or with a step-by-step movement. I accomplish the first-named object by the use of pulleys that are revolved continuously in opposite directions, and to these are applied frictional clutches, one set of which is brought into action as the other set is taken out of action, so that after the taps have been revolved in one direction to screw them into the couplings and cut the screw-thread the frictional clutches are moved so that the pulley revolving in the opposite direction acts to unscrew the said taps. I provide a frictional device to revolve the drum which carries the holding-vises, and I stop the rotation of this drum while the couplings are being tapped, and at the proper time after the taps have been withdrawn from the couplings the drum is partially rotated to bring another set of couplings into position to be acted upon.

In the drawings, Figure 1 is an elevation at one side of the machine. Fig. 2 is a cross-section at the line *x x*, Fig. 1, at the drum and holding devices. Fig. 3 is a longitudinal section. Fig. 4 is a detached view of the devices for stopping the drum. Fig. 5 is a detached plan view of the levers and catches for the drum. Figs. 6 and 7 represent the tumbling weight. Fig. 8 is an elevation of one vise-jaw. Fig. 9 is an elevation of the gearing and section at *y y*, Fig. 3; and Figs. 10 and 11 are sections of the tubular shaft and central rod at the collar and key.

The frames A A′ A^2 A^3 are adapted to receive the other parts of the machine. They are connected together by the tie-bolts B and a suitable bed-frame.

B′ B^2 are the driving-pulleys, which are preferably rotated in opposite directions by belts, as indicated by the arrows.

Through the center of the machine passes a tubular shaft, B^3, sustained in journal-boxes upon the frames A A^3, and upon the ends of this tubular shaft are the pulleys B′ B^2. They, however, are not permanently connected, and are free to revolve upon such tubular shaft.

Within the tubular shaft B^3 is a rod, B^4, to which an endwise motion is given, as hereinafter indicated, and at the ends of this rod B^4 there are devices for actuating the frictional clutches or clamping devices operating in connection with the pulleys B′ B^2, so that when said rod B^4 is moved in one direction the frictional clutches or clamping device will connect the pulley B′ with the shaft B^3. When said rod B^4 is moved in the other direction, the clamping device that connected B′ with the said shaft is released, and the frictional clamping device that connects the shaft B^3 and pulley B^2 is brought into action. This frictional clamping device may be of any desired character, such as that shown in Letters Patent No. 103,634, granted May 31, 1870; but I have generally preferred to make use of a frictional coupling or clutch such as that shown in Letters Patent No. 221,396, granted November 11, 1879. I have shown the blocks *a a* bearing against the surfaces of the respective pulleys and fastened to the outer ends of the lever-arms *a′*, that are pivoted at 3 to a cross-frame on the shaft B^3, and provided with projecting arms 4, and upon the rod B^4 are the wedges 5 6. When the rod B^4 is moved in one direction, the wedges 5 will act upon the levers *a′* to bring the friction-clamps *a* into contact with the pulley B′. When the rod B^4 is moved in the other direction, the wedges 5 will release the frictional clutches and the wedges 6 will press the opposite friction-clamps, *a*, against

the pulley B². The device for giving this endwise motion to the rod B⁴ is brought into action at the proper period for changing the direction of revolution and withdrawing the taps after the tubular couplings have been operated upon by such taps. I will, however, first describe the construction of the apparatus for giving end motion to the said rod B⁴.

Upon the shaft B³ there is a pinion, *b*, gearing into a wheel, b^2, upon the shaft b^3, supported by the frames A A′. Upon this shaft b^3 is a worm-pinion, 7, gearing into a wheel, 8. Upon a tubular sleeve, *d′*, around the shaft b^5, and adjacent to the wheel 8, is a gear-wheel, 9, giving motion to a rack, b^6, which is placed longitudinally of the machine and connected to a cross-head, 10, sliding upon the stationary bars 11, and upon this cross-head 10 is a shifting-block, *c*, having a notch in the upper surface, as indicated in Figs. 3, 4, and 5, and into this notch is received the peripheral flange *c′*, upon a collar, c^{12}, that surrounds the shaft B³, and within this collar a cross-key, c^2, is provided, that passes through longitudinal slots in the shaft B³ and into a mortise in the shaft or rod B⁴; hence when the collar c^{12} is moved endwise upon the shaft B³, the rod B⁴ receives an end motion to bring the wedges 5 or 6 into action, as aforesaid. The collar c^{12} is made in two parts screwed together, as shown, so as to confine the key c^2.

In order to communicate to the said collar the desired movement lengthwise of the shaft B³ at the proper time, I provide a weight, *d*, which has an eye by which it is suspended loosely from the tubular sleeve *d′*, surrounding the shaft b^5. The worm-wheel 8 is keyed fast to this tubular sleeve *d′*, and upon the said tubular sleeve *d′* is fastened a head, d^2, provided with a pin, 15.

Upon the shaft b^5 is fastened a head, *e*, having two pins, 16.

It will now be understood that as the worm-wheel 8 is revolved gradually by the action of the worm-pinion 7, the tubular sleeve *d′* and the head d^2 are rotated, and that the pin 15 comes into contact with a pin, 20, near the hub of the weight *d*, which pin projects at both sides; hence the said weight *d* is moved with the wheel 8 and sleeve *d′* and partially rotated until it assumes a vertical position, and as it passes by the vertical position it falls upon the opposite side. The pin 20 engages one of the pins 16 upon the head *e*, and thereby partially revolves the said head, and with it the shaft b^5 and pinion 9, giving to the rack b^6 an endwise movement, which acts upon the cross-head 10, shifting-block *c*, collar c^{12}, and rod B⁴, and actuating the frictional clutches to disconnect one pulley, B′, and to connect the other pulley, B², or the reverse, according to the direction in which the parts are moving. It will also be apparent that when the taps and other parts of the machine are moving in one direction, the worm-pinion 7 acts to revolve the worm-wheel 8 in such a manner as to lift the weight *d* at one side of the shaft b^5, and when the taps and parts are revolved in the opposite direction the weight *d* will be lifted at the other side of the shaft b^5. Thereby the shifting mechanism will be moved in the proper direction to relieve the friction-clutch that had been in operation and engage the friction-clutch that had been out of operation.

The holding-vises E may be of any suitable construction, and they are to be adapted to the coupling or other tube or fitting that is to be tapped. I however prefer to construct the same with two jaws, *e′ e′*, and a clamping-screw, e^3, to the end of which a suitable key or wrench is applied by the attendant in loosening or in clamping the coupling or fitting within such vise. Each jaw *e′* is provided with a parallel bar, e^2, that extends to and slides in a support adjacent to the opposite jaw, so that each jaw will be stiffened and held upright by its bar; but both jaws can move in opposite directions when acted upon by the right and left hand threads of the screw e^3. This allows for clamping different sizes of couplings or fittings and insuring the proper position of the same in relation to the taps. It is preferable to make use of six of these vises and to place the same upon a hexagonal drum, D, which is mounted in bearings in the frames A′ A², so that it is capable of being revolved progressively and independently of the shaft B³, and the tubular journals of the drum D are in journal-boxes *f* upon the frames A′ A². Upon this drum D there are three stop-pins, *g*, (see Figs. 4 and 5,) and upon the hub of the drum D there is a gear-wheel, *g′*, gearing into a pinion, g^2, on the shaft 20, and there is a gear-wheel, g^3, also upon the shaft 20, between friction-plates 21, keyed upon the said shaft 20. This wheel g^3 is rotated by a pinion, *h;* but the said gear-wheel moves between the friction-plates 21 and does not turn the shaft 20 until the stop, hereinafter described, which holds one of the pins *g*, is removed, so as to allow the drum D to receive a partial rotation. The pinion *h* is upon a shaft, *h′*, driven by a gear-wheel, h^2, and pinion h^3 upon the shaft B³. The stop mechanism that acts upon the pins *g* is shown in the detached views, Figs. 4 and 5. The stop-pawl *k* is pivoted at 22, and provided with a finger, 23, which is in the path of the pins *g* to stop the rotation of the drum D. The vertical shaft *k′* is provided with an arm, 24, and link 25, connected to *k*, and upon the vertical shaft *k′* is a second arm, 26, and upon the cross-head 10 and shift-block C there is a catch-rod, k^2, the end of which comes in contact with the arm 26, when said cross-head 10 is moved after the taps have been withdrawn, so that at that moment the holding-pawl *k* liberates the drum D, and it, with the vises, is allowed to revolve one-third of a revolution. This catch-rod k^2 receives endwise movement by the action of a lever, k^3, pivoted at k^8, against which one of the pins *g* operates, so that said catch-rod k^2, after having caused the libera-

tion of one of the pins *g* from the finger 23, is drawn back by the lever k^3 unlatching the arm 26 and allowing the shaft *k'* and arms 24 and 26 to be partially rotated as the catch-lever *k* and its finger 23 are returned by a spring into the path of the next pin *g*, so as to stop the further rotation of the drum D and vises E. During the partial rotation of the drum D the pin *g* strikes and passes by the end of k^3, moving the same as aforesaid, after which the spring k^4 restores the catch-rod k^2 to its normal position, and it is preferable to employ a spring behind the catch-lever *k* to operate the same when the catch-rod k^2 is withdrawn from contact with the arm 26. The stop 23 prevents the drum D revolving during the tapping operation, and this stop is withdrawn at the time the taps are away from the couplings and the gearing is turning in the proper direction for moving the drum. Any suitable spring stop or pawl acting against one of the stops or pins *g* will prevent the drum being turned backwardly when the movement of the gearing is reversed.

L L' L^2 L^3 are tubular shafts which support the stocks *n* of the taps *n'*. The tubular shafts L L' receive motion from the pinions M and gear-wheel M', (see Fig. 9,) which surrounds and is loose upon the shaft B^3, and receives motion from the pinion M^2 upon the counter-shaft b^3. The tubular shafts L^2 L^3 have to be revolved in the opposite direction. I therefore employ the pinion *o* upon the counter-shaft *h'*, gear-wheel *o'*, loose upon the shaft B^3, intermediate pinions, o^2 o^3, and pinions o^4 o^5, upon the respective tubular shafts L^2 L^3. These pinions o^2 o^3 are each sufficiently long to gear into the wheel *o'* at one portion of the length, and into the respective pinions o^4 o^5 at the other portion of their length, as indicated in Figs. 1 and 2.

In Figs. 2 and 9 the arrows indicate the direction in which the gearing is revolving when the taps are being screwed in. The taps *n'* and their stocks *n* are made in the same manner in all four of the shafts L L' L^2 L^3. The stock *n* is provided with an arm guided in a groove or mortise in its tubular shaft, so that the stock is rotated by and with the tubular shaft, and the stock projects at its rear end, and is provided with a screw, n^3, passing into a stationary nut, n^4, secured to the respective frames by columns and clamps n^5. The screw n^3 has the same number of threads to the inch that there is upon the taps *n'*, and it will now be understood that when the tubular shaft of the stock is rotated in one direction, the tap will, by the screw n^3, be projected toward and into the coupling or tube to be tapped, and that the tap will cut the screw-thread, and when rotated in the opposite direction the tap will be withdrawn from the coupling, and this withdrawing operation is to be sufficient to free the end of the tap from the coupling, and from the vise that holds the same, in order that the hexagonal drum carrying the same may revolve, as before described.

When this machine is being used, the attendant removes the two couplings or fittings that have been tapped and places in position two other couplings to be tapped. This is done during the time that the two previously-introduced couplings are being tapped from opposite sides by the respective taps *n'*; hence there is no loss of time, and as soon as the two last-mentioned couplings have been tapped the hexagonal drum is rotated one-third of a revolution to bring two more of the said couplings or fittings into position to be tapped, as aforesaid.

I claim as my invention—

1. The combination, with the tubular shaft, driving-pulleys, and frictional coupling devices for connecting the respective pulleys with the shaft, of the bar extending through the tubular shaft, and the wedges at the ends of such bar to act upon the friction-couplings, substantially as set forth.

2. The combination of the tubular shaft B^3, pulleys, and frictional couplings with the rod B^4, collar, shifting-block, cross-head, rack b^6, gear-wheel 9, shaft b^5, tubular sleeve *d'*, gear 8, worm-pinion, weight *d*, and heads d^2 and *e*, substantially as set forth.

3. The combination, with the revolving drum and vises, of the stops *g*, stop-pawl *k*, shaft *k'*, arms and link, the catch-rod, and the lever k^3 and cross-head, substantially as set forth.

4. The combination, in a vise, of two jaws, a guide-bar attached to each jaw and passing through an opening in the other jaw, a screw having right and left hand threads for actuating the jaws, and a support for the jaws and screw, substantially as set forth.

Signed by me this 14th day of November, A. D. 1883.

THOMAS G. MORSE.

Witnesses:
JOHN FERRIER,
JAMES HIGGINS.