No. 659,898. Patented Oct. 16, 1900.

W. J. READ.

MACHINE FOR CUTTING OR SAWING, &c.

(Application filed Jan. 26, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

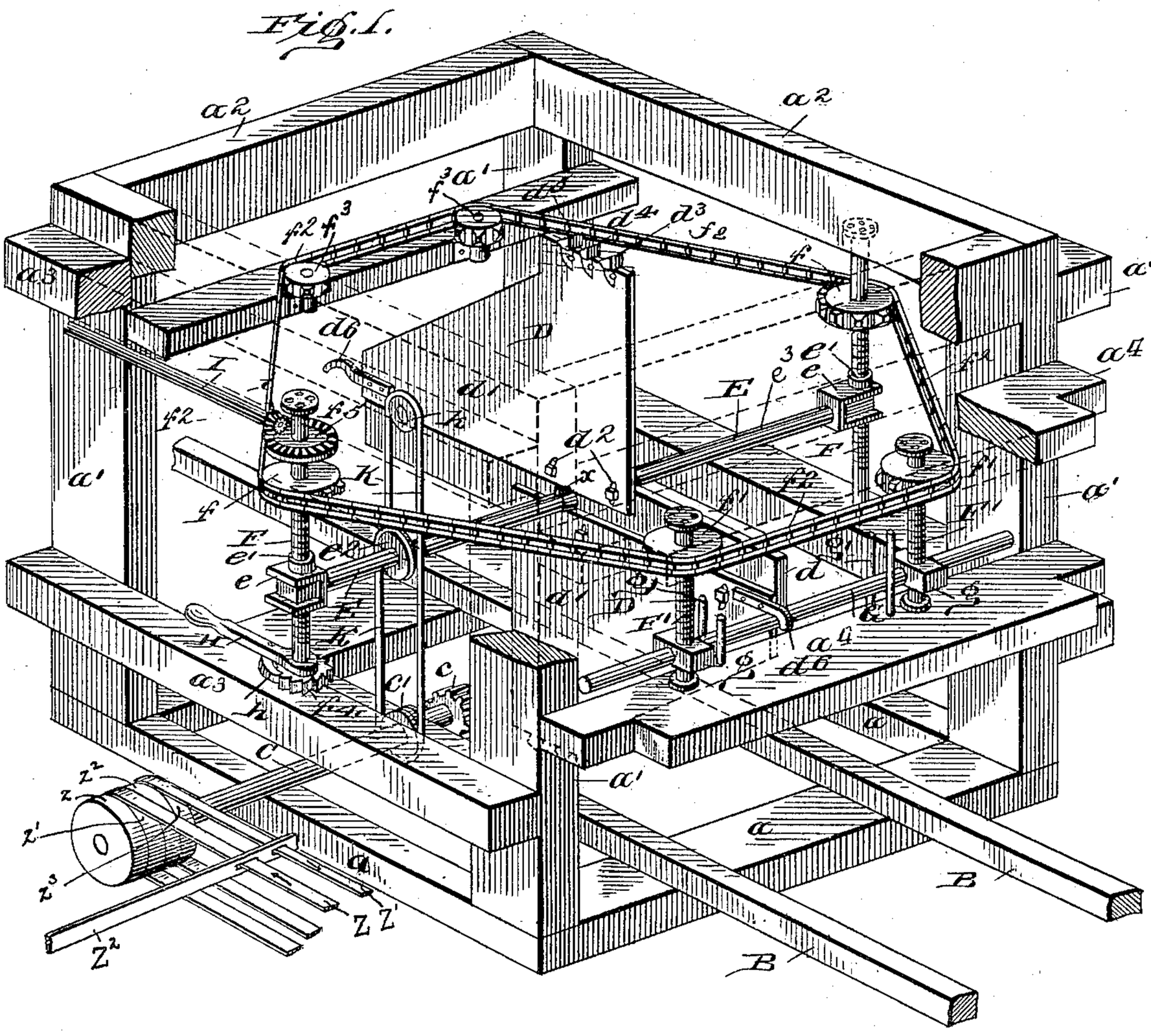
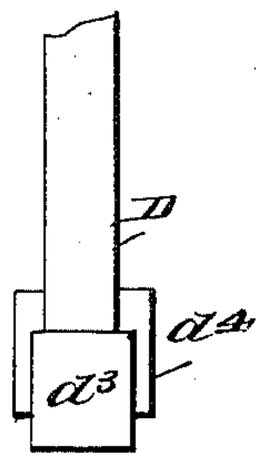


Fig. 3.



Witnesses:
J. M. Fowler Jr.
Georgia A. Breeton.

Inventor:
William J. Read,
by Gales & Moore,
his Attorneys.

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Fig. 5.

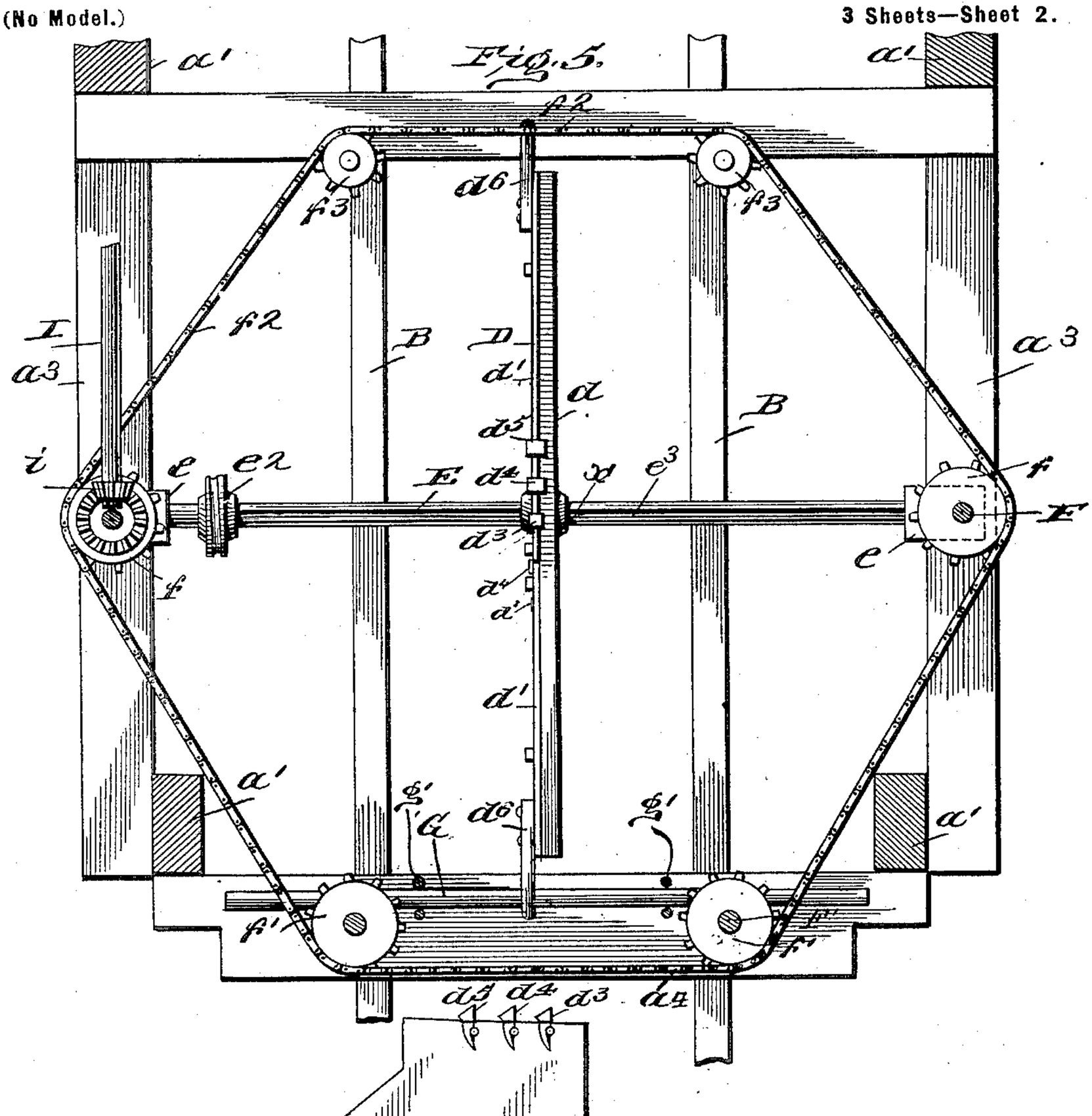

Fig. 6.

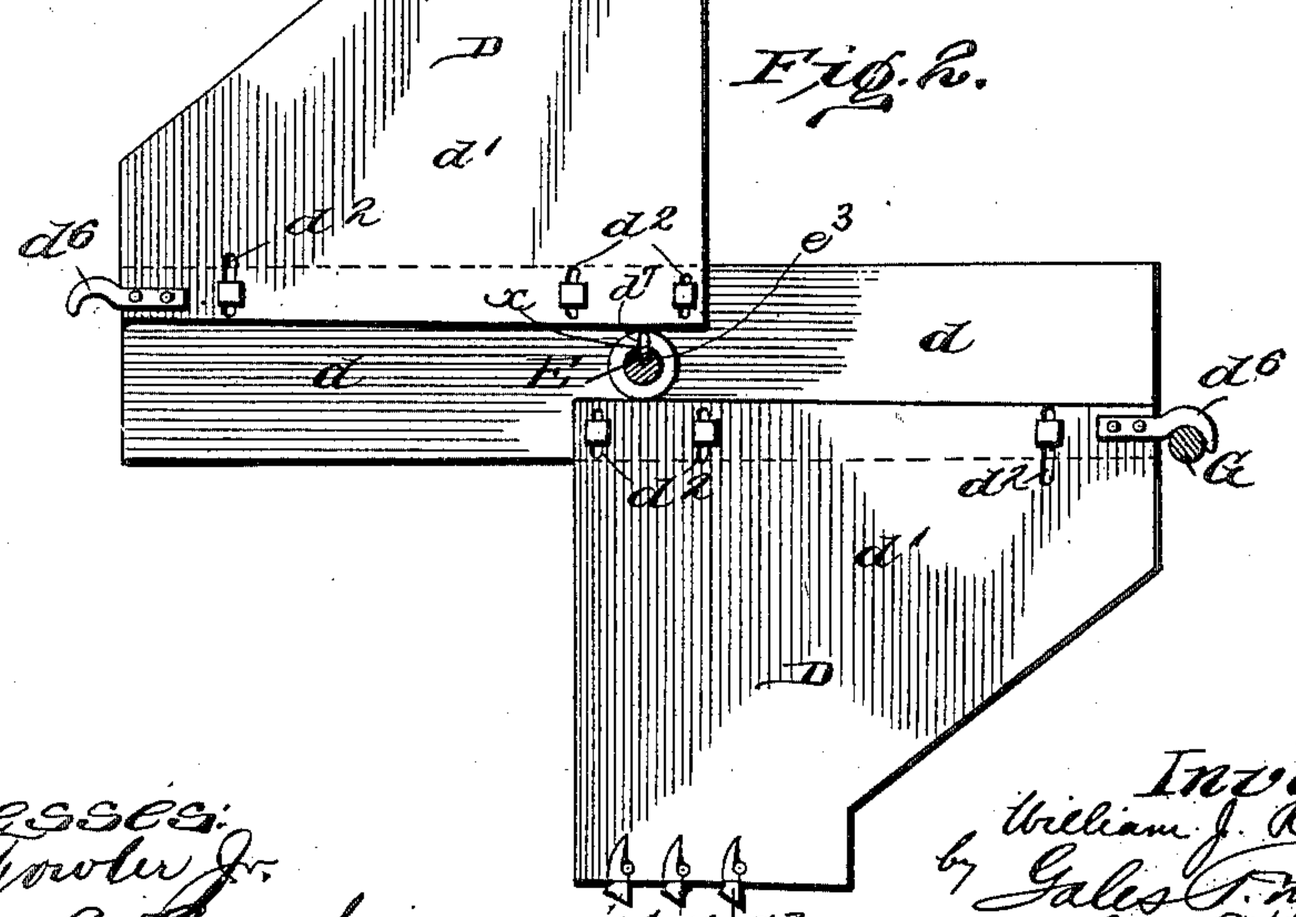

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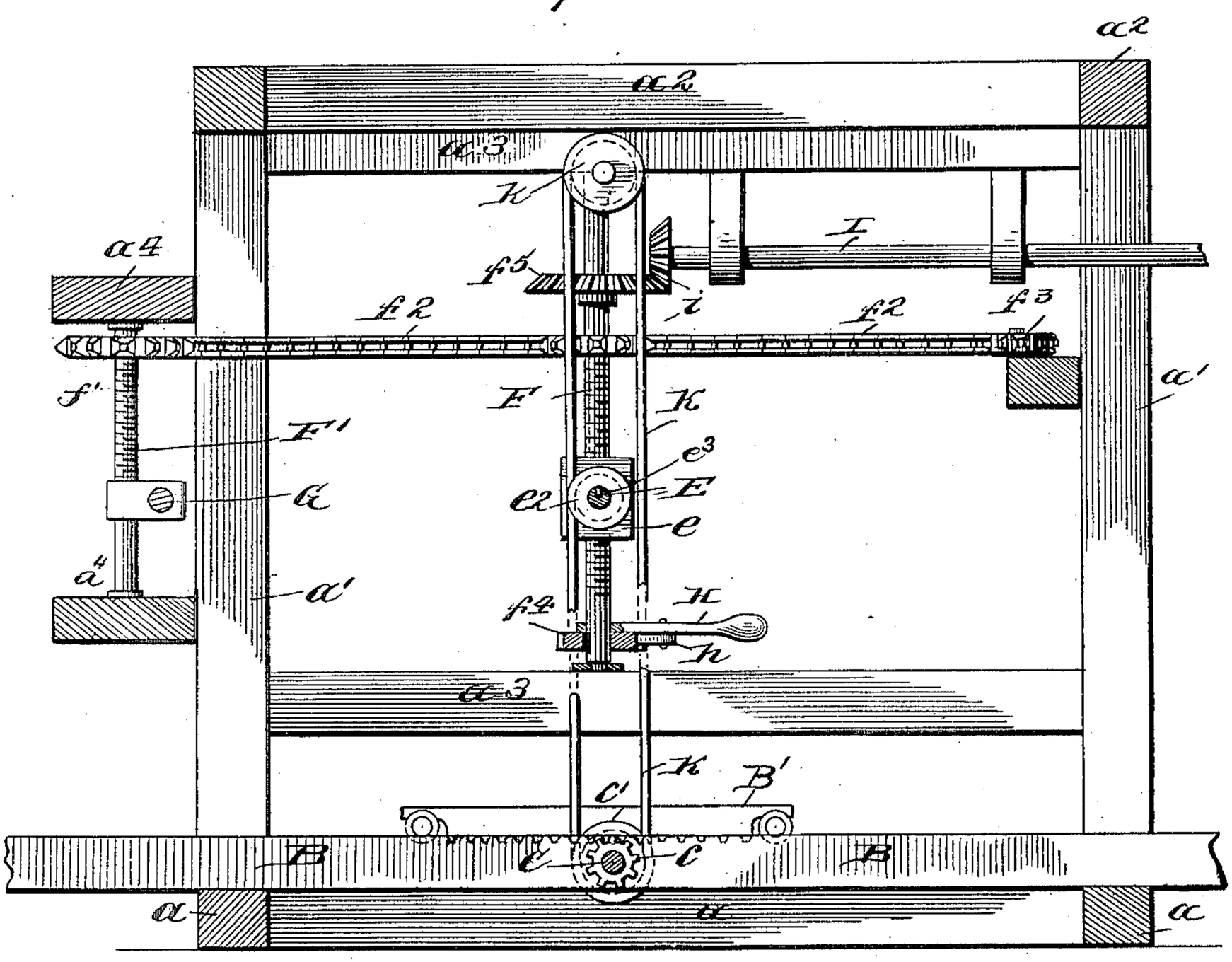
Fig. 4.



Witnesses:
J. McGowler Jr
George A. Breeton.

Inventor:
William J. Read,
by Gales & Moore
his Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM J. READ, OF ELKINS, WEST VIRGINIA.

MACHINE FOR CUTTING OR SAWING, &c.

SPECIFICATION forming part of Letters Patent No. 659,898, dated October 16, 1900.

Application filed January 26, 1900. Serial No. 2,910. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. READ, a citizen of the United States, residing at Elkins, in the county of Randolph, State of West Virginia, have invented certain new and useful Improvements in Machines for Cutting or Sawing and the Like, of which the following is a description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to machines for cutting or sawing, and is particularly designed as a machine for sawing stone, although it will be understood that the mechanism can also be employed in machines for planing, dressing, cutting, and sawing various materials and for like purposes.

My objects are to provide a machine in which the cutting-tool is caused to act in each direction of reciprocation, such tool being saved from undue heating or abrasion, in which the parts are braced to withstand the cutting action, and in which the cutting-tool is readily fed to its work.

To these ends and also to improve generally upon devices of the nature indicated my invention consists in the various matters hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a perspective view of the present machine. Fig. 2 is a side elevation of the saws and their supporting-shaft and bar, said shaft and bar being shown in section. Fig. 3 is a detail front elevation of a portion of a saw, showing the teeth. Fig. 4 is a detail elevation looking from the inside of the machine, certain of the parts being shown in section; and Fig. 5 is a top plan view, the upper beams being removed.

Referring now more particularly to these drawings, a represents the base-beams of the frame, and from said base-beams rise suitable uprights a', connected at their tops by the top beams a^2. Along the sides of the frame and across its front are suitable intermediate upper and lower beams a^3 a^4, respectively. The truck or carriage B′ for carrying the stone to be operated upon travels upon the tracks B and is given motion by means of the usual pinion c upon the customary shaft C, said shaft being adapted to have its rotation reversed in any well-known or desired manner, whereby the truck or carriage for the stone is given reciprocation under the cutting-tool or saw D. The mechanism here shown for reversing the shaft comprises pulleys z, z', z^2, and z^3, the pulleys z and z^3 being fast upon the shaft, while the pulleys z' and z^2 are loosely mounted thereon. Two belts Z and Z′ pass over suitable pulleys of the set just mentioned, said belts being properly spaced by passing through openings in the belt-shifting bar Z^2, this spacing being such that the belts engage a pulley and a second pulley therefrom. These belts being mounted upon pulleys connected to the driving mechanism (not shown) and being given movement whereby the belts move oppositely, as indicated by the arrows thereon, it will be readily apparent that when the belt Z engages the loose pulley z' the belt Z′ engages the fast pulley z^3, and thus rotates the shaft in one direction, (indicated by the arrow on the belt Z′,) while when the belts are shifted the belt Z′ engages the loose pulley z^2 and the belt Z engages the fast pulley z, thus rotating the shaft in the reverse direction—*i. e.*, the direction indicated by the arrow on the belt Z.

The cutting-tool comprises a stiff back-piece d, firmly connected to a shaft E, hereinafter referred to as the "saw-supporting shaft," to turn therewith, said shaft being suitably journaled in a manner to be hereinafter described in order to permit movement about its axis. The back-piece d extends oppositely upon each side of the shaft E, and upon the said back-piece are supported cutting-tools, here shown as saws, these saws being reversely arranged—*i. e.*, when one saw occupies the lower position to effect cutting of the stone passed under it the other saw upon the opposite portion of the back is in upper position and out of the path of travel of the stone; but when the shaft is given a half-turn said second-mentioned saw is brought into lower position ready to cut the stone in its reverse movement, while the first-mentioned saw occupies the upper position out of the path of travel of the stone. Thus the stone is cut during each reciprocation, and as the saws operate alternately in the manner just described there is wear upon a saw only while it is actually cutting, and, furthermore, after each saw

makes its cut it is swung out of the way and permitted to cool before it is thrown into position for its next cut. The cut in the stone can be kept clear and the cooling of the saw assisted by a suitable stream of water. Manifestly a gang of saws can be provided upon the shaft E, if so desired.

The saw-back is preferably so mounted that it can be moved laterally to bring the saws into positions for new cuts without changing the position of the stone on its truck. To permit this, the shaft is provided with an elongated key-seat e^3, which may extend its entire length, and a corresponding key-seat d^7 is provided in the back. A wedge-key x, forced into position in the seats in the shaft and saw-back, holds said back in position to turn with the shaft; but by removing the key the back can be moved laterally into position for a fresh cut, and then by driving the key home the parts are again connected.

Preferably each saw-body d' comprises a sheet of steel of about a quarter of an inch in thickness and three feet in height, this sheet having at its inner portion—*i. e.*, the portion near the back d—suitable elongated slots d^2, adapted to receive bolts, whereby the sheet is clamped to the back, while the teeth d^3, d^4, and d^5 are inserted in the outer or cutting edge of the saw-body in any suitable manner. These teeth are slightly wider than is the saw-body. Manifestly they can be variously arranged; but I prefer the arrangement of three teeth, as herein described and as shown in the drawings. The elongated slots d^2 permit the saw-body to be tilted upon the back d, and preferably the forward end of the saw—*i. e.*, the end first encountered by the stone in its movement—is slightly the lower. This permits the forward tooth d^3 to do the down-cutting, while the following teeth d^4 and d^5 serve to keep the sides of the cut clear. The rear tooth d^5 assists the middle tooth d^4 in keeping the way open on the sides of the cut not only to keep the saw from binding, but also to enable the insertion of a fresh tooth when the forward or down-cutting tooth wears too much. In some instances—*e. g.*, in cutting a thick stone—it has been found advantageous to make the following teeth d^4 and d^5 slightly wider than the forward tooth. By reversing the tilt of the saw-body—*i. e.*, by making the rear end slightly lower than the forward end—the teeth can be made to cut in layers, each tooth cutting slightly deeper than its predecessor.

Having thus described the cutting-tool or saw and its operation, I pass now to a consideration of the mechanism whereby said cutting-tool is supported, braced, reversed, and fed.

Reference has heretofore been made to the saw-supporting shaft E, to which the back d is firmly fastened. This shaft is journaled at each end in a box e, whereby there is permitted the movement of the shaft on its axis necessary to reverse the saws, as above described, and each box is provided with a threaded opening, as e', to receive a threaded vertical shaft F, suitably revolubly mounted on the upper and lower intermediate side beams and extending between them. Other threaded vertical shafts F' are correspondingly mounted on the upper and lower intermediate beams across the front of the frame, and each of these latter-mentioned shafts carries a box g, having a threaded opening for its respective shaft, said boxes also supporting a horizontal bar G. This bar G is adapted to be engaged by the hooks d^6, which extend outwardly from the ends of the saw-back d, whereby said bar acts as a stop member and the cutting-tool is supported upon the shaft E and the bar G. The hooks d^6 are oppositely turned, as illustrated, whereby when the saw for cutting in the forward movement of the stone is in position the hook engages the upper side of the bar, and thus prevents the stone in its passage from pulling the said saw downwardly, while when the saw for cutting during the reverse movement of the stone is in operative position the hook engages the under side of the bar and prevents the stone in its passage from forcing the saw upwardly. Furthermore, the hooks engage also the outer side of the bar, and thus the bar and the shaft are temporarily locked together, whereby said shaft is braced to withstand any tendency to bend in the direction of strain—*i. e.*, toward the direction of movement of the stone. The weight of the saws assists to hold the parts from vertical displacement. If desired, vertical braces g' can be secured to the intermediate front beams, the bar G extending between sets of such braces and being thereby assisted to withstand horizontal strain.

Each vertical threaded shaft F F' is provided near its upper end with a sprocket-wheel f f', respectively, and about these wheels passes a chain f^2, said chain also passing over suitable idler-pulleys f^3 upon a rear beam of the frame, whereby the chain is spread to prevent the same from interfering with the free rotation of the cutting-tool. Manifestly the shafts being thus connected movement of one is transmitted to the others and the boxes carrying the shaft E and the bar G can be fed along the shafts F F' in unison.

In order to feed the shaft and bar downwardly, a lever H is loosely sleeved upon one of the shafts F, and said lever carries a pawl h, adapted to engage ratchets on a wheel f^4, keyed or otherwise fixed to said vertical shaft. This lever being under the control of the operator the manner of rotating said vertical shaft to cause downward feed of the cutting-tool is obvious. To rapidly return the tool to raised position after the cut has been made, a bevel-gear f^5 is also keyed or otherwise fixed to said vertical shaft, and with this said gear meshes a corresponding gear i upon a line-shaft I, which is suitably connected to the source of power to permit

said shaft to be thrown out of operative connection during the time the saw is cutting and thrown into connection to raise the tool after the cut has been made.

There remains now to be described the mechanism for automatically turning the shaft E on its axis to alternately bring the saws into operative position, as previously described.

Upon the shaft C, which drives the stone-supporting truck and is capable of being reversed to reciprocate said truck, is fastened a pulley c', while suitably journaled upon the frame above the shaft E (although such location is unnecessary) is an idler-pulley k. A suitable flexible connection K, as a belt or rope, passes around said pulleys c' and k and at a suitable point is also turned about a suitable friction-surface e^2 on the shaft E. This belt or rope being sufficiently taut it is manifest that when the shaft C commences to rotate in a direction opposite to that in which it has been moving the belt moves, and consequently rotates the shaft E until such rotation is stopped by reason of the engagement of a hook upon the back d with the bar G. The pulley c' then slips upon the rope until the rotation of the shaft C is again reversed, when the pulley c' again operates upon the shaft E and causes reversal of the cutting-tool, this reversal of the cutting-tool being thus automatically effected with the reversal of movement of the stone-carrying truck. As the shaft E and bar G are raised and lowered the rope of belt K simply slips upon the pulley c'. In order to afford easy reversal of the shaft E, the saws are balanced.

There is thus produced a machine in which the stone or other substance is cut during each reciprocation, the cutting-tool, however, having no unnecessary abrasion and being permitted to cool at rapidly-recurring intervals. The machine is simply constructed, the cutting-tool-supporting shaft strongly braced, the tool conveniently fed to its work and rapidly carried away therefrom, and the saws quickly, easily, and automatically reversed.

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

1. In a machine of the nature indicated, a shaft adapted to be turned about its axis, a back secured thereto and extending oppositely therefrom, and cutting-tools reversely mounted upon the oppositely-extending portions of the back, said tools extending upon opposite sides of the longitudinal axis of the back, whereby said tools can, by the movement of the shaft, be alternately brought into operative position; substantially as described.

2. In a machine of the nature indicated, a shaft, a plurality of cutting-tools secured thereto to turn therewith, means for limiting the movement of said shaft, a second shaft adapted to be reversed, and friction connection between said shafts, whereby the said tool-supporting shaft is reversed by the action of said second shaft to cause the tools to be alternately presented in operative position, the said friction connection permitting slipping of the parts when the limit of movement of the tool-supporting shaft has been reached; substantially as described.

3. In a machine of the nature indicated, a shaft, a plurality of cutting-tools secured thereto to turn therewith, means for limiting the movement of said shaft, a second shaft adapted to be reversed, and belt connection between said shafts, whereby the said tool-supporting shaft is reversed by the action of said second shaft to cause the tools to be alternately presented in operative position, the said belt connection permitting slipping of the parts when the limit of movement of the tool-supporting shaft has been reached; substantially as described.

4. In a machine of the nature indicated, a shaft, a plurality of cutting-tools secured thereto to turn therewith, a second shaft adapted to be reversed, one of said shafts being movable toward and away from the other, a suitably-supported pulley, and a belt carried thereby and in frictional engagement with said shafts, whereby said second shaft serves to oscillate said first-mentioned shaft from the movement of said second shaft, whereby the cutting-tools are alternately presented in operative position; substantially as described.

5. In a machine of the nature indicated, a shaft, a plurality of cutting-tools secured thereto to turn therewith, a second shaft adapted to be reversed, said first-mentioned shaft having movement toward and away from said second shaft, a suitably-supported pulley, and a belt between said pulley and said second-mentioned shaft and connecting said shaft and pulley, said belt also engaging the said tool-supporting shaft, whereby it serves to oscillate said first-mentioned shaft from the movement of said second shaft, whereby the cutting-tools are alternately presented in operative position; substantially as described.

6. In a machine of the nature indicated, a shaft, a plurality of cutting-tools secured thereto to turn therewith, a second shaft adapted to be reversed, one of said shafts being movable toward and away from the other, a suitably-supported pulley, and a belt carried thereby and in frictional engagement with said shafts and having a portion wound about said first-mentioned shaft, whereby said second shaft serves to oscillate said first-mentioned shaft from the movement of said second shaft, whereby the cutting-tools are alternately presented in operative position; substantially as described.

7. In a machine of the nature indicated, a cutting-tool supported to turn on its axis, a

bar, and means for temporarily connecting said tool and bar, whereby said bar braces the tool-support during the action of cutting; substantially as described.

8. In a machine of the nature indicated, a cutting-tool supported to turn on its axis, a bar, and a member upon said tool adapted to engage the bar and thus temporarily connect the said tool and bar, whereby said bar braces the tool-support during the action of cutting; substantially as described.

9. In a machine of the nature indicated, a cutting-tool supported to turn on its axis, a bar, and a hook upon said tool adapted to engage the bar to limit the movement of the tool toward its operative position and also grasp the bar to temporarily connect the bar and tool and thus cause said bar to brace the tool during the operation of cutting; substantially as described.

10. In a machine of the nature indicated, a tool-supporting back mounted to turn upon its axis, and balanced tools reversely mounted thereon on opposite sides of said axis, said tool-supporting back and tools being balanced upon said axis; substantially as described.

11. In a machine of the nature indicated, a threaded shaft, a tool-supporting member engaging said shaft and adapted to be fed thereby toward and away from its work, a tool having axial movement upon said tool-supporting member, a second threaded shaft, a stop member in engagement therewith and adapted to be correspondingly fed thereby, a member upon said tool adapted to engage the stop member to limit the movement of said tool toward its operative position, and operative connection between said shafts, whereby rotation of one shaft causes corresponding rotation of the other, and the tool and stop member are correspondingly fed; substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM J. READ.

Witnesses:

W. J. ARMSTRONG,

R. H. FARRELL.