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H. BEISHEIM.

BLOCK GROOVING AND JOINTING MACHINE.

No. 464,191. Patented Dec. 1, 1891.

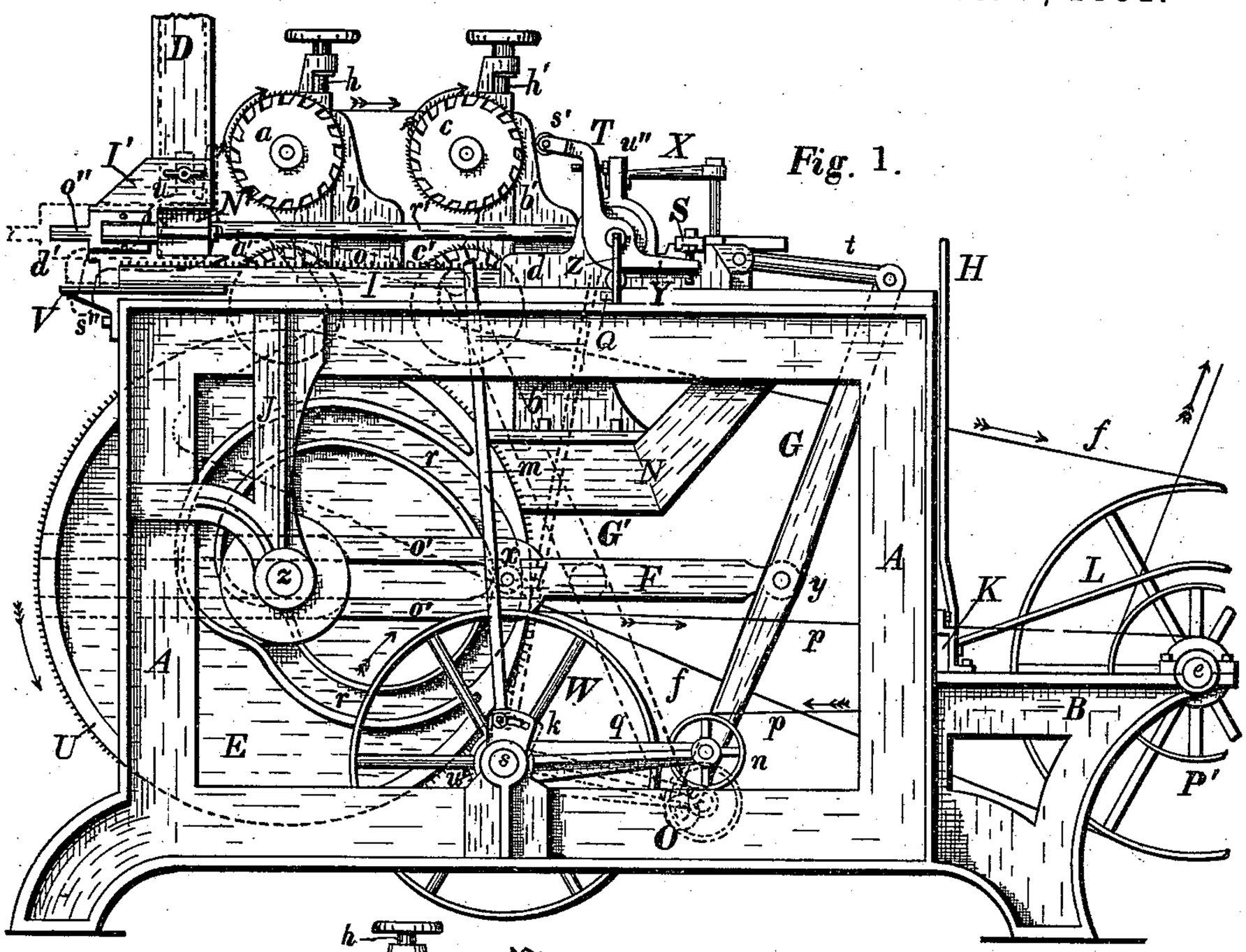

Fig. 1.

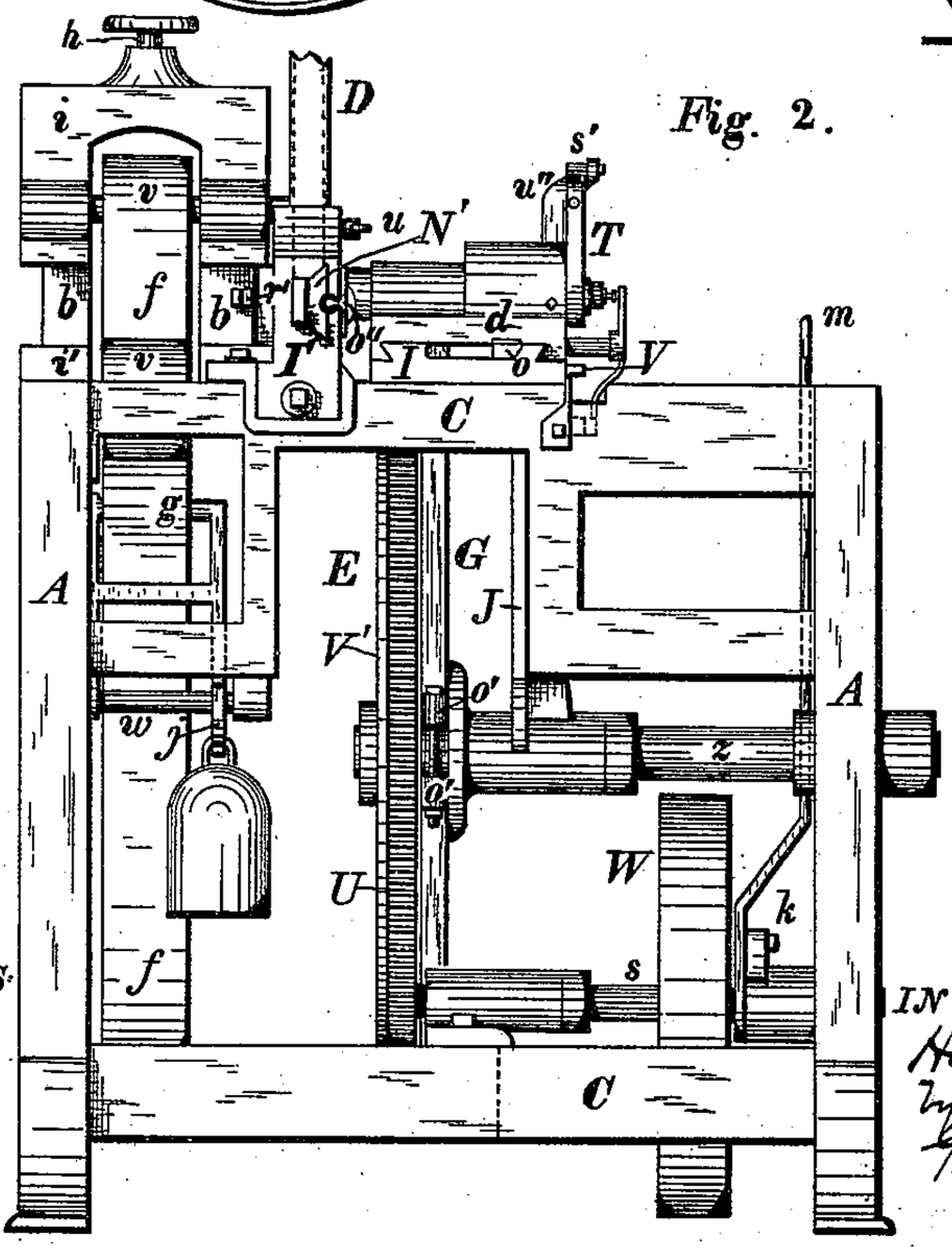

Fig. 2.

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BLOCK GROOVING AND JOINTING MACHINE.

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Fig. 3.

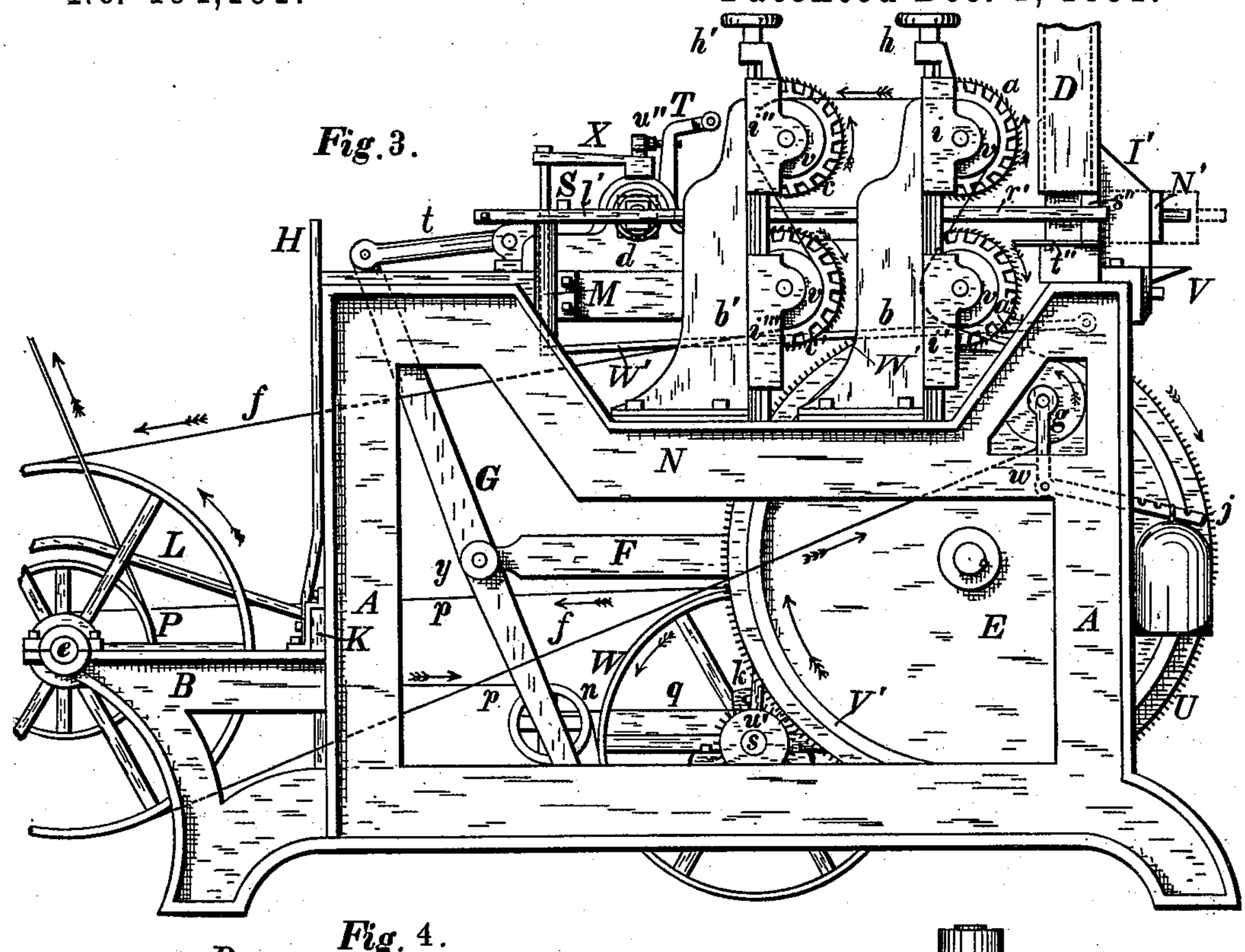

Fig. 4.

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BLOCK GROOVING AND JOINTING MACHINE.

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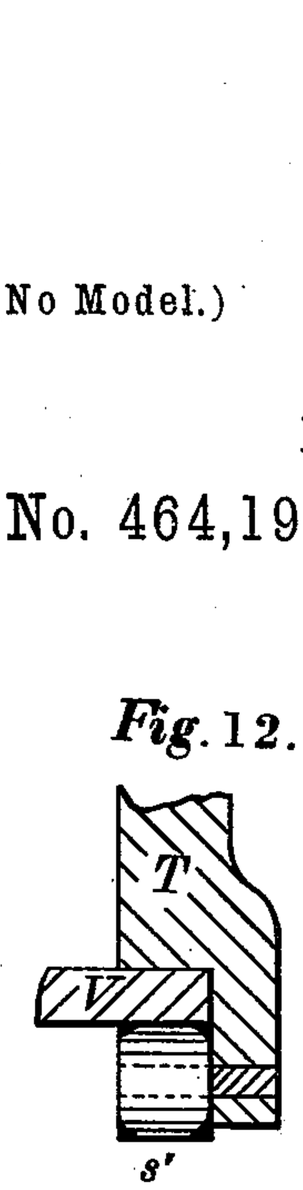
Fig. 12.



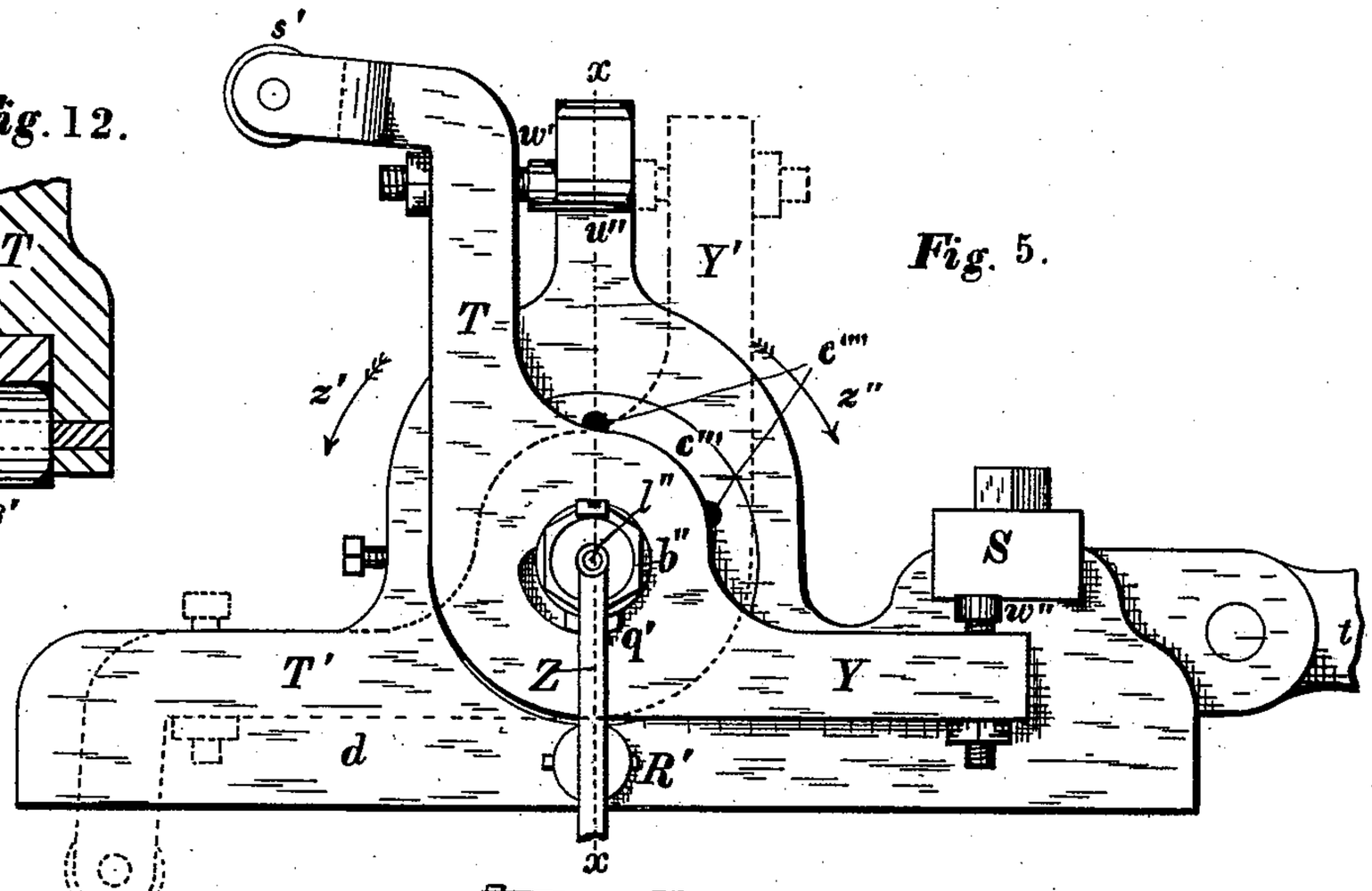


Fig. 5.

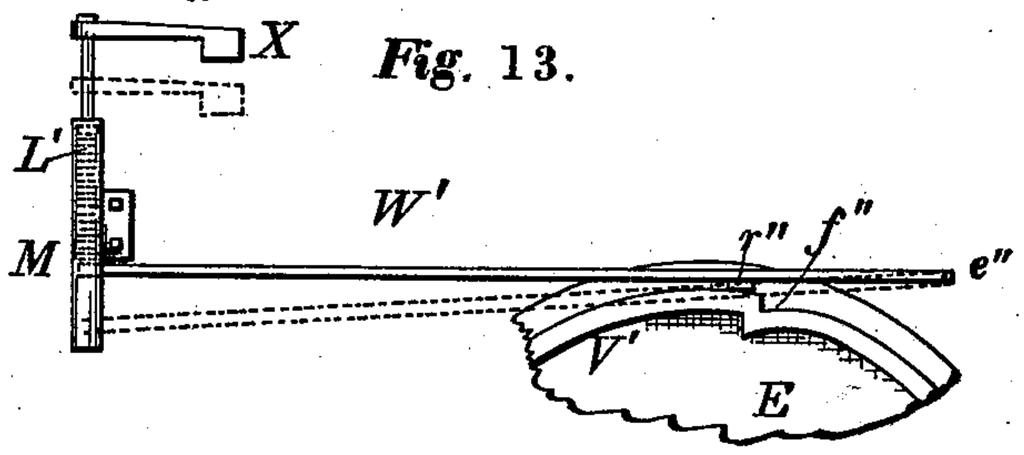
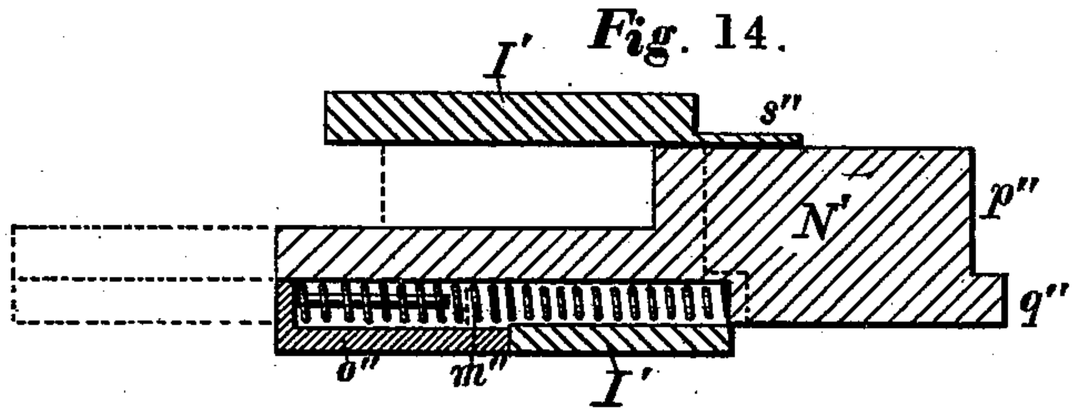


Fig. 13.

Fig. 14.



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BLOCK GROOVING AND JOINTING MACHINE.

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Fig. 6.

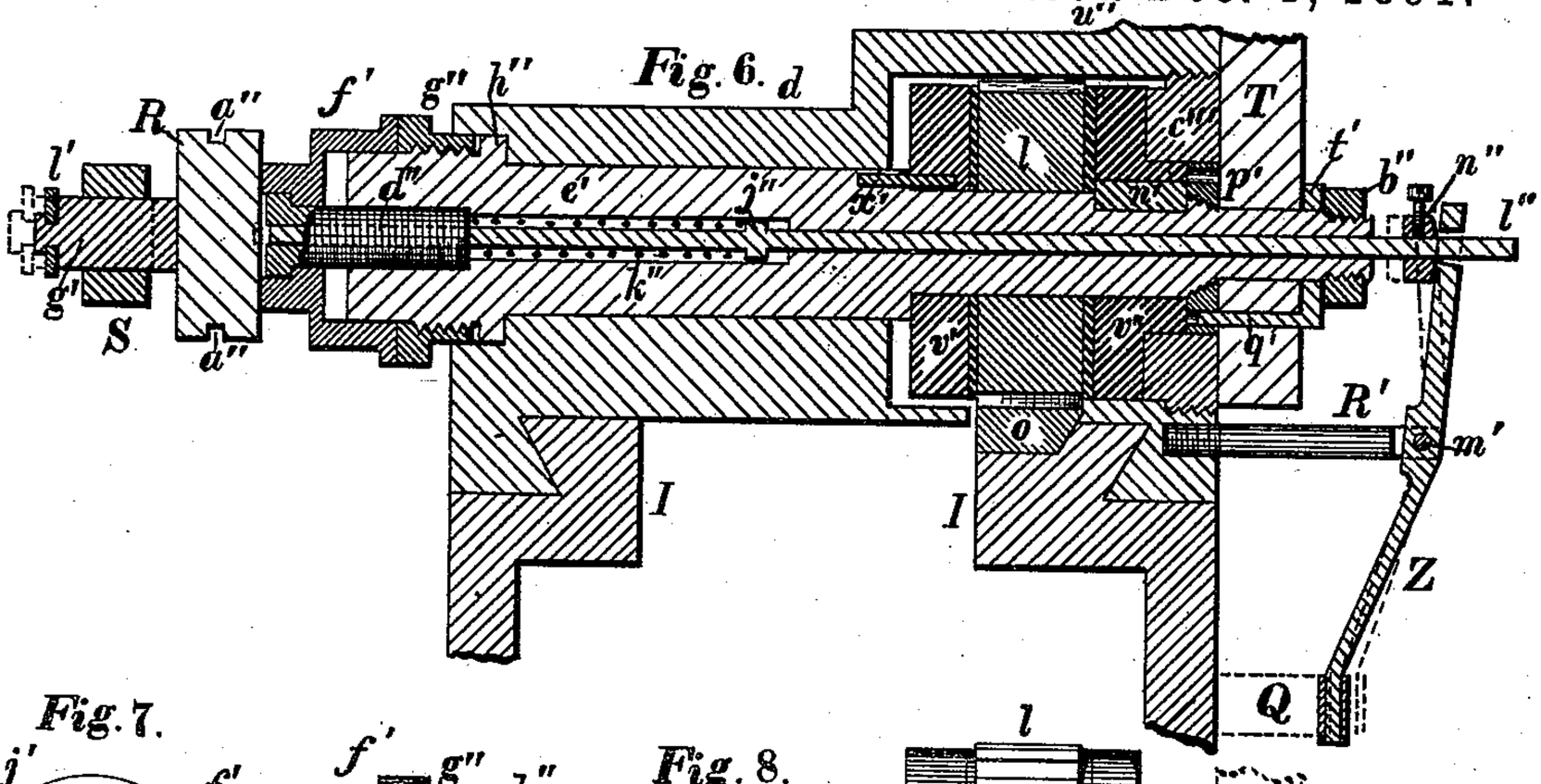


Fig. 7.

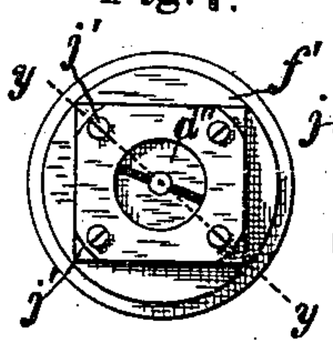


Fig. 8.

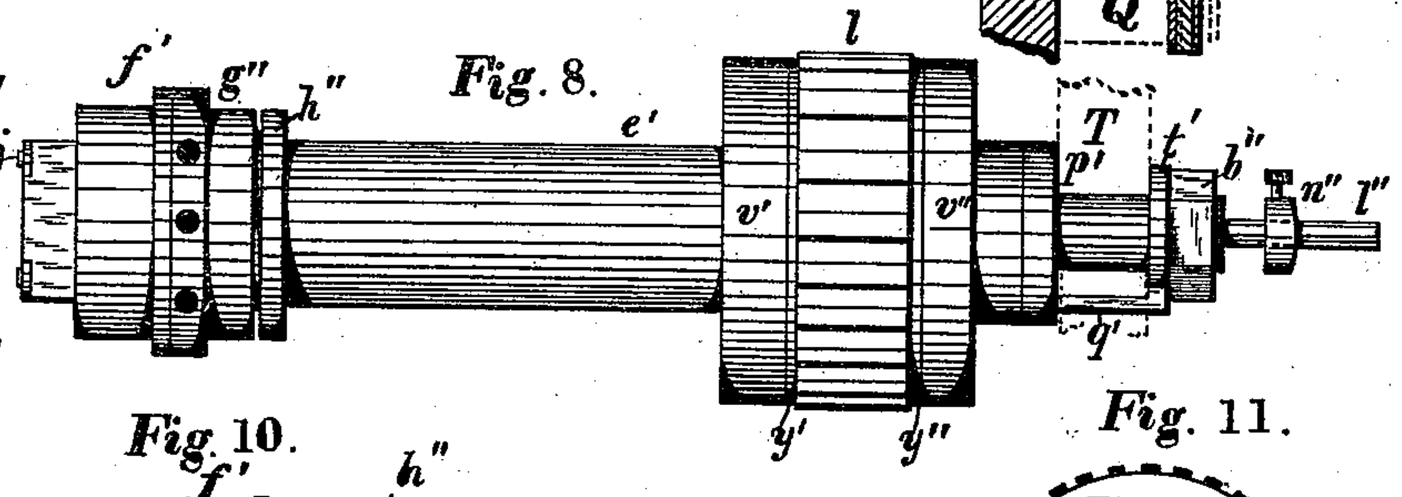


Fig. 9.

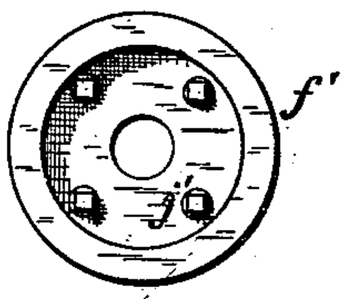


Fig. 10.

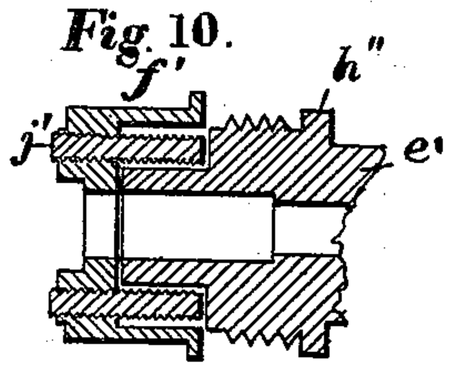


Fig. 11.

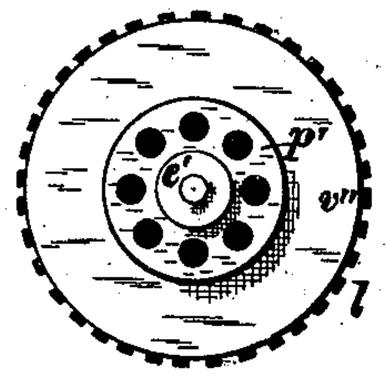
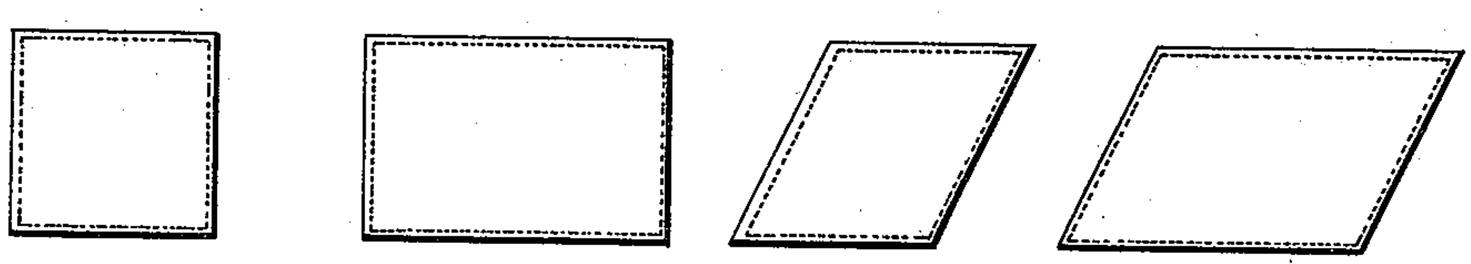


Fig. 15.



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UNITED STATES PATENT OFFICE.

HENRY BEISHEIM, OF ROCHESTER, NEW YORK, ASSIGNOR TO CHARLES E. RIDER, OF SAME PLACE.

BLOCK GROOVING AND JOINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 464,191, dated December 1, 1891.

Application filed February 18, 1885. Serial No. 156,221. (No model.)

To all whom it may concern:

Be it known that I, HENRY BEISHEIM, of Rochester, New York, have invented certain Improvements in Block Grooving and Jointing Machines, of which the following is a specification, reference being had to the accompanying drawings.

My present invention relates to improvements in block grooving and jointing machines, having for their object the production of a machine which will groove and joint all the sides of the blocks while passing once through the apparatus.

My improvements are fully described in the following specification, and the novel features thereof specified in the annexed claims.

In the accompanying drawings, representing my present improvements in block grooving and jointing machines, Figure 1 is a side elevation. Fig. 2 is an end elevation. Fig. 3 is a side elevation taken from the side opposite to that shown in Fig. 1. Fig. 4 is a plan view. Fig. 5 is an elevation of the traveling carriage on an enlarged scale. Fig. 6 is a section through the same on the line *x x*, Fig. 5. Fig. 7 is an end view of the spindle in the traveling carriage. Fig. 8 is a side view of the same. Fig. 9 shows the removable cap on the inner end of the spindle. Fig. 10 is a section through the same on the line *y y*, Fig. 7. Fig. 11 represents the outer end of the spindle. Fig. 12 represents the end of the arm which controls the motion of the spindle by which the blocks are reversed. Fig. 13 represents the block-pusher-actuating mechanism. Fig. 14 is a central horizontal section through the feeding-slide and its supporting-bracket. Fig. 15 represents some of the forms of blocks which can be jointed on my improved machine.

In the ordinary operation of my improved machine the blocks to be grooved and jointed are fed downward by gravity through the tube D, Fig. 1, and are carried by the reciprocating carriage *d* between the cutters *a a'*, by which they are grooved and jointed on two opposite sides, after which they are turned over or reversed in position before being presented to the second set of cutters *c c'*, by which the two remaining sides are grooved and jointed, and the finished blocks are finally discharged from the machine by the pusher X, while the carriage returns to a point below the feed-tube for the reception of the other blocks. The operation is thus made continuous, the blocks passing rapidly through the machine and being grooved and jointed on all sides while being conveyed through it.

My improved machine consists, essentially, of a suitable frame-work A A C C, supporting the two sets of grooving and jointing cutters *a a' c c'*, and the way or bed I, on which the reciprocating carriage *d* travels, and of suitable mechanism for holding the blocks in the carriage, for reversing their position while held therein, and for actuating the various operating parts, as hereinafter more fully described.

The side frames A A are connected together by the cross-bars C C and provided, if desired, with the projecting arms B B, which support the main driving-shaft *e*, from which, by means of the belt *f*, the two sets of cutters *a a' c c'* are operated, and from which also, by means of the belt *p*, motion is transmitted to the cam-wheel E, which imparts reciprocating motion to the traveling carriage *d*, by which the blocks are presented to the cutters. The main shaft *e* is provided with the tight and loose pulleys P P', on which the driving-belt is shifted to start or stop the machine by means of the belt-shifters L, attached to sliding bar K, connected with shifting-lever H. The cutters are supported on mandrels revolving in the journal-boxes *i i' i'' i'''*, Fig. 3, being provided with the pulleys *v v*, about which the belt *f* is led, as represented in Fig. 3. The direction in which the cutters revolve is shown by the arrows in the figures. The journal-boxes are supported on the standards *b b'*, being arranged to be adjusted up and down thereon by the screws *h h'* or other suitable means. As indicated in the drawings, the side frame A may be curved downward at N to permit of the attachment of the standards thereto. The belt *f* is carried around a tightener-pulley *g*, supported on a bent arm *j*, pivoted at *w* to the frame and provided with a weight or spring which maintains the requisite strain on the belt. The cutters consist, essentially, of two toothed disks, with a saw of slight-

ly-larger diameter between them, secured to their mandrels in any suitable manner. The cutters operate to dress or joint the sides of the blocks, while the saws cut the grooves a'', Fig. 6, in the block R. The carriage d, by which the blocks are carried through between the cutters, said blocks being reversed or made to turn a quarter of a revolution (if right-angled blocks are required) while passing from the cutters $a\ a'$ to the cutters $c\ c'$, is caused to reciprocate, as indicated by the full and dotted lines in the drawings, by means of the cam-groove r, Fig. 1, in the cam-wheel E, the sliding bar F, lever G, and link t. Motion is communicated from the driving-shaft e to the shaft s by means of the belt p, running over the pulley W. The shaft s carries a pinion u', which meshes with a ring of teeth U on the exterior of the cam-wheel E. The cam-wheel revolves with the shaft z, arranged in suitable bearings attached to the frame-work by the braces J or supported in any other suitable manner. The sliding bar F carries a roller x, Fig. 1, which fits the cam-groove r, and as the latter revolves causes the bar to reciprocate backward and forward, as indicated by the full and dotted lines in the drawings. The bar F is divided at its left-hand end in Fig. 1 into two arms $o'\ o'$, which slide along above and below the shaft z as the bar moves. The end of the bar is pivoted at y, Fig. 1, to the lever G. The lower end of the lever is pivoted to the cross-frame of the machine at O, Fig. 1, while its upper end is jointed to the link t, which is connected to the carriage d. The positions of the parts at each end of the reciprocation of the carriage are indicated by the full and dotted lines G G' $d\ d'$, Fig. 1. It will be observed that the cam-groove r is formed of such a shape as to give the carriage a quick return motion from right to left in Fig. 1, while on the forward or operative movement the speed of the carriage is reduced while the blocks are passing through between the cutters, being accelerated at other points.

Provision is made for stopping the carriage while the cutters are allowed to run by means of the tightener-pulley n, carried by the arm q, connected with the hand-lever m. By throwing the pulley n downward into the position indicated by the dotted lines in Fig. 1 the belt p is slacked and the carriage stopped. The lever m may be adjusted relatively to the arm q by means of the slotted lug k, and the lever may be provided at its upper end with a suitable locking device. The carriage d reciprocates forward and backward in the way or guide I, fastened to the cross-bars C C, so as to support the carriage in suitable relation with the cutters. As indicated in Figs. 1 and 6, the carriage is secured to the guide by a dovetailed slide. The guide is provided with a longitudinal slot in which the upper end of the lever G and the link t travel. The guideway I is provided with a rack o, the teeth of which engage with those of the pinion l, Figs. 6 and 8, on the spindle e' in the carriage d, and serve at the proper time to turn the spindle, which reverses the blocks, as hereinafter more fully described. The blocks are secured in the carriage while passing between the cutters by being clamped between the cap f', Figs. 4, 6, 7, 8, 9, and 10, on the end of the spindle e' and the plunger g', Figs. 4 and 6. The face or end of the cap is preferably provided with one or more spurs $j'\ j'$, Figs. 7, 8, 9, and 10, which penetrate a short distance into the blocks and hold them in place. The plunger g' is supported by an arm S, fastened to the carriage and constituting in effect a part thereof and reaching out around the block, so as to sustain the plunger in line with the spindle e', but on the opposite side of the block. The plunger is forced toward the spindle, thereby clamping the blocks in place by a cam-track r', Figs. 1 and 4, arranged parallel with the guideway I, and having its ends inclined or beveled, so that no pressure is caused on the blocks at each end of the reciprocation of the carriage for the purpose of permitting the feeding and discharge of the blocks at these points. A roller k', Fig. 4, connected with the plunger, bears on the cam-track r' as the carriage reciprocates. The roller may be attached directly to the plunger; but I prefer to connect it therewith by means of the spring l', as indicated in the drawings, as thereby provision is made for holding blocks of slightly different thicknesses firmly in place in the carriage during the grooving and jointing operation. The sliding motion of the plunger g', through the supporting-arm to and from the end of the spindle, is indicated by the full and dotted lines in the sectional view, Fig. 6. The end of the spring l' is fastened to an extension of the arm S. As the roller k' moves along the cam-track r' it forces the plunger g' inward toward the spindle e', thereby clamping the blocks firmly in place. The plunger may be constructed so as to revolve in the arm S when the spindle e' is turned to reverse the blocks, or the blocks may be allowed to turn on the end of the plunger, which latter practice I have found satisfactory in the practical use of my improved block jointer and groover.

Proceeding now to a description of the mechanism by which the spindle e' in the carriage d is caused to revolve, so as to reverse the position of the blocks while they are passing from the first set of cutters $a\ a'$ to the second set $c\ c'$, it must be premised that the pinion l, which meshes with the teeth of the rack o, attached to the guideway I, is not rigidly fastened to the spindle e', but is connected therewith by friction, so that it can turn without causing the spindle to rotate, unless the conditions are such that the latter can turn freely without encountering an obstacle. It will also be observed that the pinion l as the carriage reciprocates along the guideway will be caused by the rack to turn

first in one direction and then in the other. Advantage is taken of the reversal of this motion of the pinion at the ends of the movement of the carriage to turn the spindle first in one direction and then in the other, as is necessary for the operation of the machine. Thus at the end of the movement of the carriage to the right in Fig. 1, the block last operated on having been discharged, the return movement of the carriage to the left hand will impart a left-handed rotation to the pinion, as indicated by arrow z', Fig. 5, and the spindle being then free to move will rotate with the pinion until stopped. At the left-hand end of the movement of the carriage, a fresh block having been fed therein from the tube D, the movement of the carriage toward the right hand will impart a right-handed rotation to the pinion, as indicated by arrow z'', Fig. 5, which movement, however, is not allowed to turn the spindle until the carriage has conveyed the block between the first set of cutters $a\ a'$, after which and before the block has reached the second set of cutters c c' the spindle is allowed to make its partial rotation. This result is secured by attaching to the end of the spindle an arm T, which turns with it and carries at one end a stud or roller s', which at the left-hand end of the movement of the carriage engages at s'', Fig. 1, underneath the guide V, and prevents the turning of the spindle until the block has passed through the first set of cutters. The guide V is made of suitable length to prevent the turning of the spindle from the friction of the pinion l until the block has been grooved and jointed on two opposite sides by the first set of cutters, after which, the stud s' being released from the guide V, the friction of the pinion causes the spindle to rotate, thereby turning the block so that its unjointed sides are presented to the action of the second set of cutters $c\ c'$ by the continued movement of the carriage. The guide V consists of a longitudinal flange or rib projecting sidewise from the guideway I and attached thereto in any suitable manner. The edge of the guide V fits between the stud or roller s' and a shoulder on the arm T when the latter occupies the position T', Fig. 5. The arrangement is clearly indicated in Fig. 12. As the carriage d travels from left to right while presenting the blocks to the cutters returning empty, the block is carried between the first set of cutters $a\ a'$, by which it is grooved and jointed on two opposite sides, and when the stud s' passes beyond the inner end of the guide V the friction of the pinion l turns the spindle and reverses the position of the block, so that the two other sides are presented to the action of the cutters $c\ c'$. The position of the arm on the spindle e' when the blocks are passing through between the first set of cutters $a\ a'$ is represented by the dotted lines T' in Fig. 5, and the position after the reversal of the blocks and while they are passing between the second set of cutters $c\ c'$ is represented in full lines in said figure. Suitable stops are arranged to limit and control the swinging movement of the arm and the spindle. The stops may be arranged in any convenient way, but are preferably made adjustable. In the accompanying drawings I have represented a stop u'' as attached to the carriage and projecting into the path of the arm T, so as to arrest the motion at the proper points. The arm T is provided with an extension or secondary arm Y, Figs. 1, 4, and 5, which arrests the movement in one direction, as indicated at Y', Fig. 5, by striking against the stop u'', while the motion in the other direction is stopped by the arm itself coming against the stop, as indicated by the full lines in the same figure. Both the arms T and Y are preferably provided with adjustable contact-points, which, as shown in the drawings, may consist of the screws $w'\ w''$, Fig. 5, threaded through the arms and provided with jam-nuts or other means for securing them in place when once set, so that the spindle will turn an exact quarter of a revolution for right-angled blocks. The pinion l revolves on the spindle e' between the friction-collars $v'\ v''$, Fig. 6, which are fastened to the spindle, so that the friction between them and the pinion will cause the spindle to turn in the same direction with the pinion whenever, during the traveling movement of the carriage, the spindle is free to turn. At other times, when the movement of the spindle is prevented, the pinion turns between the collars, the friction thereby produced serving to hold the spindle steady. The rubber or leather friction-washers $y'\ y''$, Fig. 8, are interposed between the pinion and the friction-collars. The collar v' is fastened to the spindle by the pin or key x', Fig. 6. The collar v'' is forced against the pinion by the nut p', Figs. 6, 8, and 11, a key or spline n' being arranged to cause the collar to revolve with the spindle. The pressure between the collars and the pinion may be adjusted by means of the nut p'. In order to hold the nut p' from turning on the shaft, I bore a number of holes into it (see Fig. 11) and insert into one of the holes, when the friction has been properly adjusted, an arm q', attached to a collar t', clamped against the outside of the arm T by the nut b'', which screws onto the outer end of the spindle. The arm T is prevented from turning on the spindle by a key or pin; but as the arm q' passes through a curved slot in the arm T (see Figs. 5 and 6) it is evident that the pressure of the friction-collars on the pinion may be adjusted by turning the nut p', by means of the collar t' and arm q', without removing the arm T from the spindle. A screw-collar c''', Fig. 6, is inserted in the end of the carriage to hold the parts in place and sustain the outer end of the spindle, a series of perforations c'''' being made in the outer flat surface of the collar to receive a suitable wrench, by which the collar is inserted or removed. At the end

next to the block the spindle e' is provided with one or more spurs j', which enter the block a short distance and secure it firmly in place. As these spurs are subjected to wear, I prefer to insert them in the cap f' on the end of the spindle, so that they may be sharpened and adjusted outward from the face of the cap. This arrangement is shown in Figs. 9 and 10, from an inspection of which it will be seen that the spurs are threaded and inserted in threaded holes in the cap, so that they may be adjusted outward when desired, the inner ends of the spurs being squared to permit the use of a wrench in turning them. The inner ends of the spurs project into slots cut in the end of the spindle. The cap f' is secured to the spindle, so that it may be adjusted thereon by means of the screws d'' and screw-collar g''. The screw d'' is inserted in the end of the spindle, the head being countersunk in the face of the cap. As shown in Fig. 8, the screw-collar g'' is provided with perforations in the flange at its outer end by the insertion of a rod, into which the collar is turned on the spindle to clamp the cap firmly in place. The spindle has a collar h'' on it, which fits against a suitable shoulder on the carriage and receives the pressure transmitted by the plunger g' through the block to the spindle.

In order to insure the discharge of the block at the end of the movement of the carriage, I insert through the spindle e' the discharger-rod l'', Figs. 6 and 8, which receives a longitudinal movement through the spindle, so as to project its end beyond the cap f' at the proper time to force the block off the spurs. The discharger-rod is provided with a collar j'', Fig. 6, against which a spring k'', located within the spindle, bears and presses the rod constantly toward the right hand in that figure. At the outer end of the discharger-rod it is connected with a lever Z, pivoted to the carriage and arranged to have its lower end come in contact with a lug or projection Q, Fig. 6, on the side of the guideway I at the time it is desired to discharge the blocks from the carriage. The lever Z is pivoted at m' to the stud R', inserted in the outer face of the carriage. The upper end of the lever is forked and bears against a collar n'' on the discharger or is otherwise suitably connected therewith. When the carriage approaches the end of its movement toward the right, the lower end of the lever Z strikes against the lug Q and is forced outward, thereby causing the discharger-rod to slide lengthwise through the spindle and pushing the blocks off of the spurs on the cap f'.

It remains to describe the automatic block-feeding device by which the blocks falling by gravity through the feed-tube D are delivered within the grasp of the carriage, so as to be conveyed between the cutters. The feed-tube D, which is made of such dimensions that the blocks may fall freely through it, is removably connected with the bracket I' by means of the screw and thumb-nut u, Fig. 1, which readily permits the substitution of a tube full of blocks for an empty one, the side of the tube being slotted and adapted to receive the countersunk head of the screw. The bracket I' supports the feeding-slide N', which is pushed toward the left hand by the carriage and allows the lower block to fall down between the end of the spindle e' and the plunger g' at the time when the roller k' is at k'', Fig. 4, or opposite the beveled end of the track r'. As the carriage commences its return movement the roller runs up the incline and the block is clamped between the plunger and the end of the spindle. As the carriage returns, the feeding-slide N' is forced along with it by the spring m'', Fig. 14, and the block, one side of which bears against the end of the plunger, is carried along by it until it is secured in place in the carriage. At the same time the feeding-slide passes under the next block in the feed-tube and prevents its descent until the carriage has again performed its journey forward and back, ready to receive it and to repeat the grooving and jointing operation. The side of the cap f' on the spindle e' strikes against the lug q'', Fig. 14, on the feeding-slide. The spring m'', which forces the feeding-slide toward the cutters, may be applied thereto in any suitable manner—as, for instance, as represented in the drawings, by placing it within a longitudinal tube on the slide, the outer end of the spring being sustained by an arm o'', which projects into the tube through a slot in its side. The arm o'' is attached to the bracket. The movement of the slide when the carriage presses it back to permit the feeding of a block from the tube is represented by dotted lines in the various figures. A guard-plate s'', Figs. 3 and 14, may be employed to prevent the displacement of the block laterally as it descends from the feed-tubes when the slide is pushed back. A support t'', Figs. 3 and 4, is also provided below the block to sustain it while being fed forward into the grasp of the carriage by the slide. The parts may, however, be so arranged that the block is grasped by the plunger and spindle without being pushed forward by the slide, the spring on which in this case merely performs the function of returning it in place. The pusher for discharging the blocks from the carriage after they have been grooved and jointed on all sides and its operating mechanism are represented in Fig. 13. The cam-wheel E has on its side a circular rib or flange V', which sustains the lever W' and the block pusher or discharger X in the position represented by the full lines in Fig. 13; but when the notch f''' passes by the lug r'' on the lever the pusher is suddenly forced downward by the spring L', concealed in the standard M, (see dotted lines,) and its projecting end strikes the block underneath it and discharges it out of the machine through a suitable spout. The standard M is fastened

to the guide I or the frame-work, and it has a slot in its side through which the rod which carries the pusher is connected to the end of the lever. The lever is pivoted at e'' to the guide I.

My improved block-jointing machine, as herein described, is capable of being used to joint blocks square, oblong, rhombic, and rhomboidal in section, the machine being adapted to these purposes by varying the angle through which the spindle e' turns and by placing the cutters at suitable distances apart.

It is obvious that by employing additional sets of cutters the principle of the machine can be extended to jointing six and eight sided blocks and blocks of irregular forms.

I claim—

1. The combination, with the two sets of rotary cutters $a\ a'\ c\ c'$, adapted to act in succession on the opposite sides of the blocks, of the reciprocating block-conveying carriage d, provided with rotatable block-clamps, and means for securing a partial rotation of said clamps while the blocks are passing from the first to the second set of cutters, substantially as and for the purposes set forth.

2. The combination of an automatic block-feeding device with the two sets of rotary cutters $a\ a'\ c\ c'$, adapted to act in succession on the opposite sides of the blocks, the reciprocating block-conveying carriage d, provided with rotatable block-clamps, and means for securing a partial rotation of said clamps while the blocks are passing from the first to the second set of cutters, substantially as and for the purposes set forth.

3. The combination of an automatic block-feeding device with the two sets of rotary cutters $a\ a'\ c\ c'$, adapted to act in succession on the opposite sides of the blocks, the reciprocating block-conveying carriage d, provided with rotatable block-clamps, and means for securing a partial rotation of said clamps while the blocks are passing from the first to the second set of cutters, and a suitable block-discharging device, substantially as and for the purposes set forth.

4. The combination, with the two sets of rotary cutters $a\ a'\ c\ c'$, adapted to act in succession on the opposite sides of the blocks, of the reciprocating block-conveying carriage d, guideway I, rack o, pinion l, and spindle e', adapted to reverse the position of the blocks between the cutters, substantially as described.

5. The combination, with the rotary cutters $a\ a'$, of the reciprocating block-conveying carriage d, provided with plunger g', arranged to press upon the block during its passage between the cutters, and stationary track r', adapted to force the plunger against the block, substantially as described.

6. The combination, with the rotary cutters $a\ a'$, of the reciprocating block-conveying carriage d, provided with arm S, carrying plunger g', arranged to press upon the block during its passage between the cutters, spring l', connected to the plunger g', so as to draw it away from the block, and stationary track r', adapted to force the plunger against the block, substantially as described.

7. The combination, with the two sets of rotary cutters $a\ a'\ c\ c'$, of the reciprocating block-conveying carriage d, provided with rotatable spindle e' and plunger g', arranged to clamp the blocks between their inner ends, track r', and means for giving the spindle a partial revolution while the block is traveling from the first to the second set of cutters, substantially as described.

8. The combination, with the reciprocating block-conveying carriage d, of the spindle e', provided with adjustable cap f', and the spring-actuated plunger g', substantially as described.

9. The combination, with the rotary cutters $a\ a'\ c\ c'$, of the block-conveying carriage d, arranged to reciprocate on the guideway I, so as to carry the blocks in succession between the two sets of cutters, toothed rack o, extending parallel to the guideway, spring-actuated plunger g', and spindle e', having pinion l meshing with the rack and connected with the spindle by a suitable friction connection, substantially as described.

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Witnesses:
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