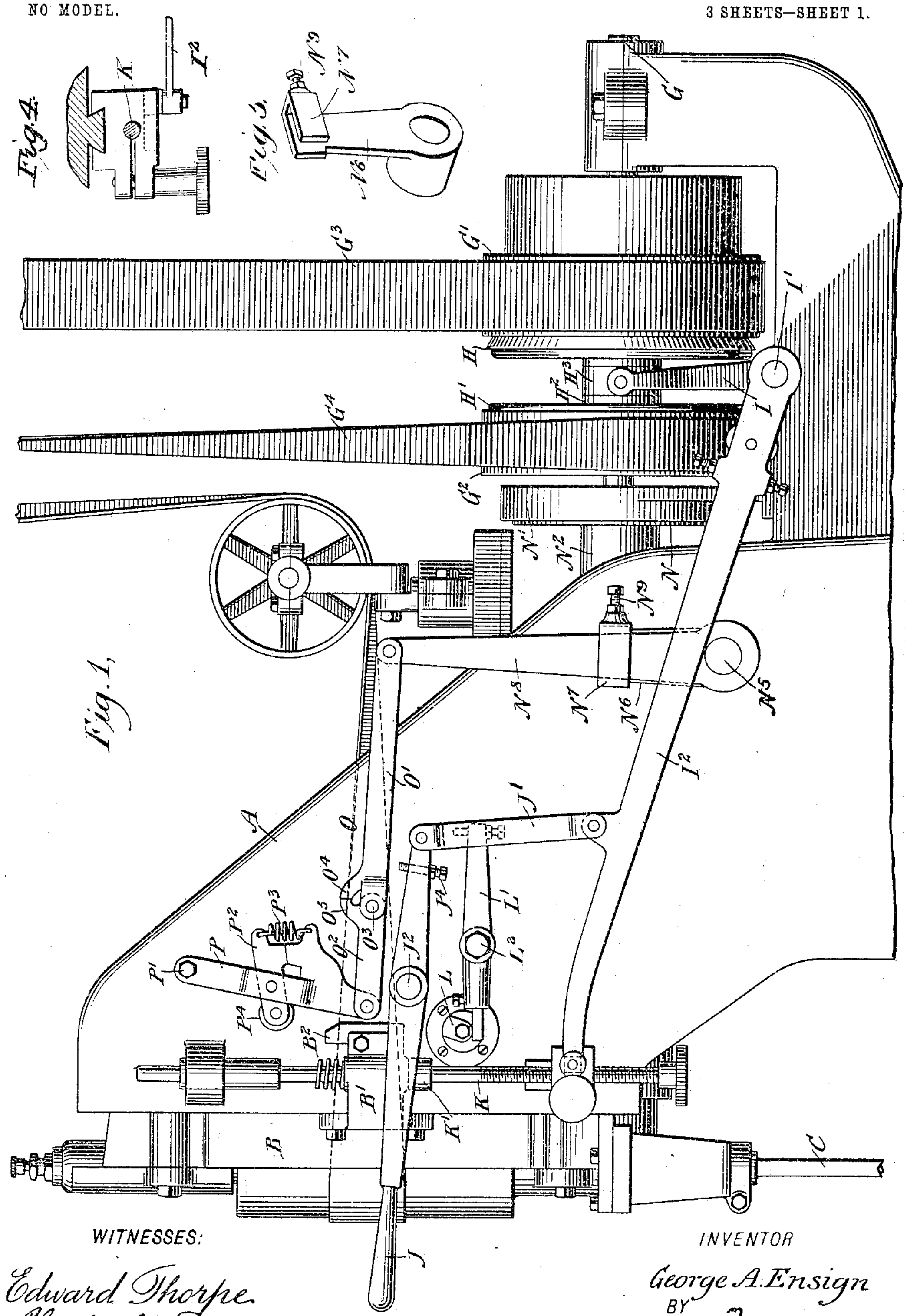
No. 766,608. PATENTED AUG. 2, 1904.

G. A. ENSIGN.

FRICTION BRAKE.

APPLICATION FILED MAR. 26, 1904.

NO MODEL. 3 SHEETS—SHEET 1.



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NO MODEL. 3 SHEETS—SHEET 2.

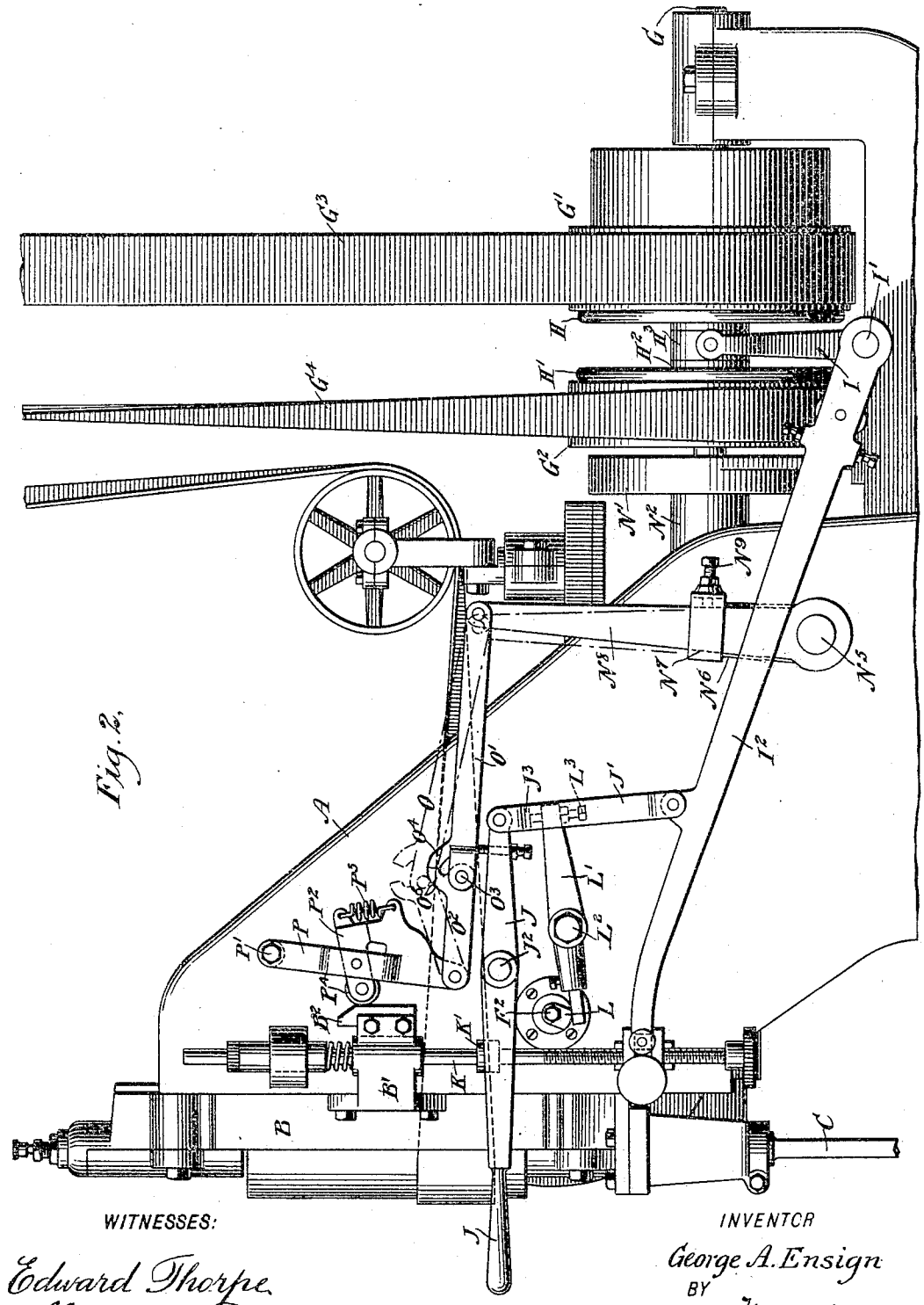

Fig. 2.

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NO MODEL. 3 SHEETS—SHEET 3.

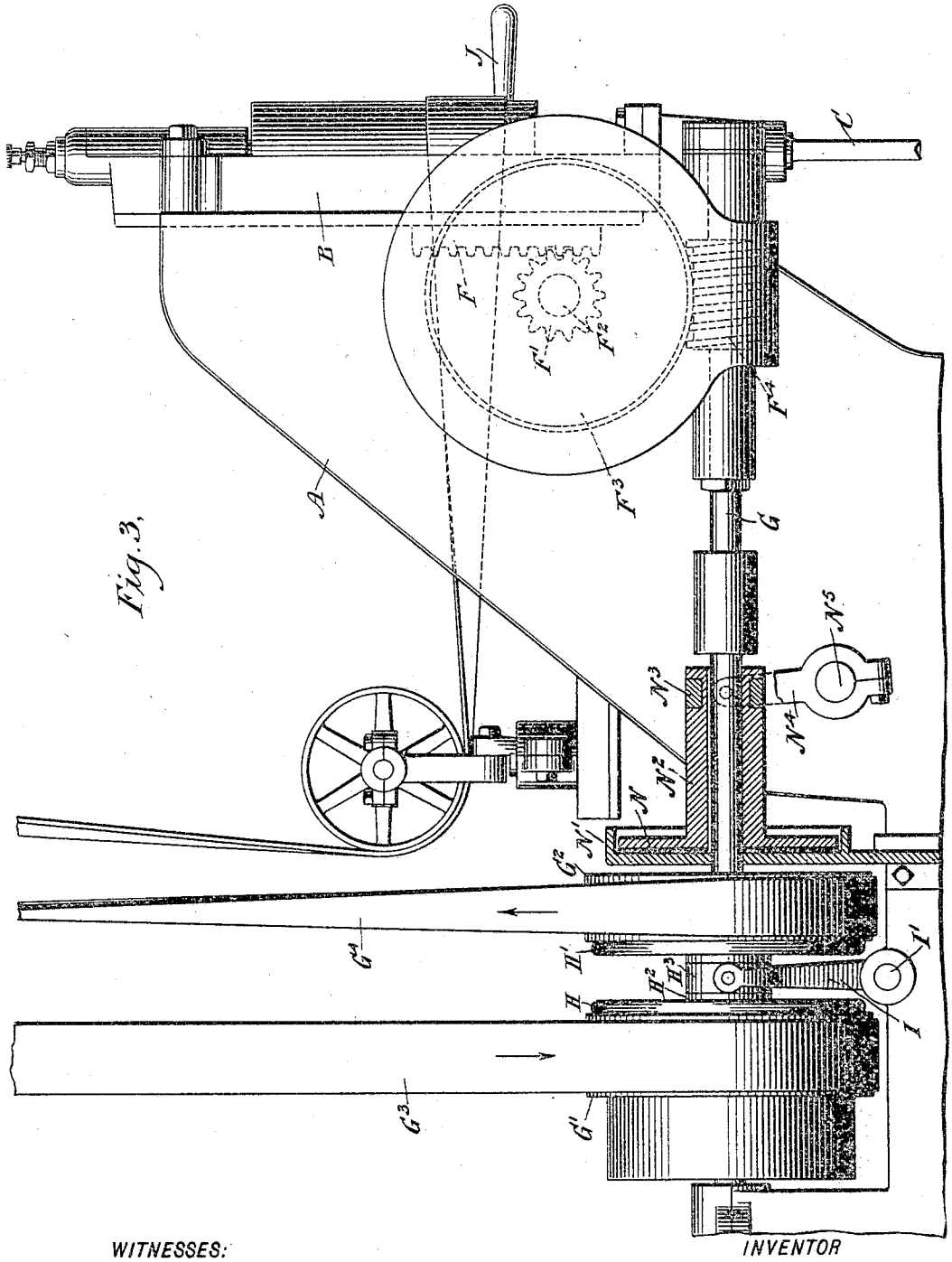

Fig. 3.

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No. 766,608. Patented August 2, 1904.

UNITED STATES PATENT OFFICE.

GEORGE A. ENSIGN, OF DEFIANCE, OHIO, ASSIGNOR TO THE DEFIANCE MACHINE WORKS, OF DEFIANCE, OHIO.

FRICTION-BRAKE.

SPECIFICATION forming part of Letters Patent No. 766,608, dated August 2, 1904.

Original application filed January 15, 1904, Serial No. 189,145. Divided and this application filed March 26, 1904. Serial No. 200,112. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. ENSIGN, a citizen of the United States, and a resident of Defiance, in the county of Defiance and State of Ohio, have invented a new and Improved Friction-Brake, of which the following is a full, clear, and exact description, this being a division of the application for Letters Patent of the United States for a mortising-machine, Serial No. 189,145, filed by me January 15, 1904.

The object of the invention is to provide a new and improved friction-brake for use on shafts and other driven parts to bring the said parts automatically and quickly to a standstill at the desired time.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement in a released position as applied to a mortising-machine. Fig. 2 is a like view of the same, showing the brake in an active position. Fig. 3 is a rear sectional side elevation of the same. Fig. 4 is a plan view of the connection between the shifting-lever and the sliding rod actuated by the cross-head, the said rod and the bearing for the said connection being shown in section; and Fig. 5 is a perspective view of the forked arm of the shifting-lever for the friction stopping device.

The woodworking-machine on which the improved friction-brake is shown applied is mounted on a suitably-constructed main frame A, on which is arranged to reciprocate in a vertical direction a cross-head B, carrying a cutting device C, and on the rear of the cross-head (see Fig. 3) is secured a rack F, in mesh with a pinion F′, secured on a transverse shaft F^2, journaled in suitable bearings on the main frame A. On the shaft F^2 is secured a worm-wheel F^3, in mesh with a worm F^4, secured on the main driving-shaft G of the machine, and the said main shaft G is journaled in suitable bearings on the rear side of the main frame A, as plainly indicated in Fig. 3.

On the main shaft G are mounted to rotate loosely clutch-pulleys G′ and G^2, connected by belts G^3 and G^4 with overhead pulleys arranged for driving the clutch-pulleys at a different rate of speed, the said belt G^4 being crossed, so that the clutch-pulleys G′ and G^2 are continually driven in opposite directions. The clutch members (not shown) of the clutch-pulleys G′ and G^2 are adapted to be alternately engaged by the clutch members H and H′ of a double clutch, having a hub H^2 connecting the members H and H′ with each other, said hub being mounted to turn with and to slide on the main shaft G.

The hub H^2 of the double clutch is provided with a shifting collar H^3, engaged by the fork-arm I of a shifting-lever I^2, having its shaft I′ journaled in bearings on the main frame A, and when the shifting-lever I^2 is swung upward then the double clutch is shifted from the left to the right, so that the clutch member H engages the clutch member of the clutch-pulley G′ to cause the latter to rotate the double clutch, and consequently the shaft G, in one direction at a slow speed for the worm F^4, worm-wheel F^3, shaft F^2, pinion F′, and rack F to impart a slow downward sliding motion to the cross-head B and the mortising-tools C to move the latter into the work.

When the shifting-lever I^2 is swung downward into the position shown in Fig. 1, then the double clutch is shifted from the right to the left, so as to disengage the clutch member H from the clutch member of the clutch-pulley G′ and to move the clutch member H′ in engagement with the clutch member of the clutch-pulley G^2 to cause a rotation of the main shaft G in a reverse direction and at a high rate of speed to move the cross-head B quickly upward on the return stroke and the mortising-tools C out of the work. When the double clutch stands in the intermediate posi-

tion, (shown in Figs. 2 and 3,) then the shaft G is at a standstill—that is, the machine is at rest.

The shifting-lever I^2 is pivotally connected by a link J′ with a hand-lever J, fulcrumed at J^2 on the front side of the main frame A, said hand-lever J being within convenient reach of the operator, so that when it is desired to start the machine the operator swings the front end of the hand-lever downward to cause the link J′ to swing the shifting-lever I^2 upward for engaging the clutch member H with the clutch member of the clutch-pulley G′ to start the machine and to move the cross-head B on its downward stroke.

A downward swinging motion is given to the shifting-lever I^2 from the cross-head B at the time the latter moves in the last portion of its downward stroke, and for this purpose the cross-head B is provided with a collar K′ on a rod K, pivotally connected with the free end of the shifting-lever I^2. In order to move the double clutch into an inactive or intermediate position at the time the cross-head B has reached about one-half of its upstroke, a cam-arm L is provided, secured on the front end of the shaft F^2, and this cam-arm is adapted to engage one end of a lever L′, fulcrumed at L^2 on the main frame A, and on the other end of the said lever L′ is held a set-screw L^3, adapted to engage a projection J^3 on the link J′, connecting the shifting-lever I^2 with the hand-lever J. Now when the actuating mechanism moves the cross-head B upward, then the rotation of the shaft F^2 causes the arm L to impart a swinging motion to the lever L′ at the time the cross-head B is about one-half the distance of its return or up stroke, and the lever L′ by its set-screw L^3 engaging the projection J^3 causes an upward movement of the link J′ and a consequent upward swinging motion of the shifting-lever I^2 to move the double friction-clutch from the left to the right into an intermediate position to free the double clutch of both friction-pulleys, and hence the double clutch and the main shaft G are left free to rotate by their acquired momentum.

In order to stop the shaft G at the time the cross-head B has reached the end of its upstroke, the following friction device is provided: A friction-disk N (see Figs. 1 and 3) is adapted to move in frictional engagement with a friction-disk N′, secured to the main frame A, and the hub of the said friction-disk N is mounted to turn with and to slide lengthwise on the main shaft G. A shifting collar N^3 is arranged on the hub N^2 of the movable friction-disk N, and the said collar N^3 is engaged by a shifting fork N^4, secured on the rear end of a shaft N^5, extending transversely and journaled in suitable bearings arranged on the main frame A. On the front end of the shaft N^5 (see Figs. 1 and 2) is secured an arm N^6, provided with a fork N^7, straddling a shifting-lever N^8, engaged by a set-screw N^9, screwing in the fork N^7 of the arm N^6. The shifting-lever N^8 is loosely fulcrumed on the shaft N^5 alongside the arm N^6, and by having the set-screw N^9 a minute adjustment can be had between the shifting-lever and the arm N^6 to compensate for any wear between the faces of the movable friction-disk N and the fixed friction-disk N′.

The upper end of the shifting-lever N^8 is pivotally connected by a link O with an arm P, hung at its upper end at P′ on the main frame A, and on the said arm P is fulcrumed a lever P^2, pressed by a spring P^3 at one end and supporting at its other end a friction-roller P^4, adapted to be engaged by a cam B^2, secured to the arm B′, attached to the cross-head B.

The link O, connecting the shifting-lever N^8 with the arm P, is made in two sections O′ and O^2, pivotally connected with each other at O^3, and the said sections are provided at their fulcrum ends with knuckles O^4 and O^5, adapted to abut one against the other when the sections O′ and O^2 are closed—that is, standing in alinement one with the other, as plainly illustrated in Figs. 1 and 2. The sections O′ and O^2 are adapted to be opened or swung into such position that the sections stand at angles one to the other, as plainly indicated in dotted lines in Fig. 2, and for this purpose a set-screw J^4 is provided, held on the hand-lever J, the said set-screw being adapted to engage the under side of the section O′ to swing the latter open, and thereby open the link O.

When the machine is at rest, as shown in Fig. 2, the link O is closed and the friction-roller P^4 abuts against the cam B^2, and the movable friction-disk N is at this time in frictional engagement with the fixed friction-disk N′.

When the machine is started by the operator pressing the hand-lever J downward, as previously described, then the set-screw J^4 moves in engagement with the section O′ of the link O to open the link, as shown in dotted lines in Fig. 2, so that the movable friction-disk N moves out of engagement with the fixed disk N′. The disks N and N′ remain disconnected during the downstroke of the cross-head B and also during the time the cross-head B is positively moved upward by the gearing described; but when the cross-head B is traveling in the last portion of the upstroke under the force of the momentum acquired by the double clutch and the shaft G then the cam B^2 moves in engagement with the friction-roller P^4, and thereby imparts a swinging motion to the arm P from the left to the right, so that the link O is shifted in a like direction, and consequently imparts a swinging motion to the shifting lever N^8 from the left to the right, thus turning the shaft N^5, which by the fork N^4 imparts movement from the left to the right to the disk N to

move the latter in frictional contact with the fixed disk N′ to bring the shaft G to a stop at the time the cross-head B reaches the end of its upward stroke.

It is understood that after the machine is started and the cross-head B is moved downward then the cam B^2 finally passes the friction-roller P^4 (see Fig. 1) for the cam B^2 to release the arm P, so that the sectional link O is free to close by its own weight, thereby imparting a swinging motion to the arm P from the right to the left to bring the friction-roller P^4 in the path of the cam B^2 when the latter moves upward with the cross-head B during the upstroke of the same.

The arm P is provided with the spring-pressed lever P^2 to allow swinging this arm at the time the cross-head B moves downward and the lower end of the cam B^2 comes in contact with the friction-roller P^4, thus avoiding undue shock or jar to the arm P, the sectional link, and the parts connected therewith.

It is understood that the operator holds the lever J pressed during the entire downward stroke of the cross-head B, so that the sectional link O remains open and the cam B^2 passes below the friction-roller P^4. When the operator releases the lever J at about the time the cross-head has reached the end of its downstroke, then the sectional link O closes by its own weight, as previously described, and the friction-roller P^4 then passes into the path of the cam B^2 for the latter to shift the sectional link from the left to the right to apply the brake at about the time the cross-head B reaches the end of its upstroke.

When imparting the swinging motion to the hand-lever J, as described, the set-screw J^4 opens the link O to disengage the movable friction-disk N from the fixed friction-disk N′ to allow free rotation of the shaft G.

When the cross-head moves in the last portion of its downstroke, then the arm B′ moves in engagement with the collar K′ and pushes the same downward, and with it the rod K, so that a downward swinging motion is given to the shifting-lever I^2 to move the double clutch from the right to the left—that is, to disengage the clutch member H from the clutch-pulley G′ and to move the clutch member H′ in engagement with the clutch-pulley G^2. The motion of the shaft G is now reversed, and the cross-head B is caused to slide upward, thus lifting the tools C gradually out of the work. When the cross-head B has reached about one-half of its upward stroke, then the cam-arm L moves in engagement with the free end of the lever L′, so that a swinging motion is given to the latter, and the set-screw L^3 is moved against the projection J^3 to lift the link J′, and thereby impart an upward swinging motion to the shifting-lever I^2 to move the double friction-clutch into an intermediate position; but the double clutch and shaft G keep on rotating by the acquired momentum to return the cross-head B to the end of its stroke.

When the cross-head B nears the end of its upstroke, then the cam B^2 acts on the friction-roller P^4, so as to swing the arm P from the left to the right, thus causing a shifting of the friction-disk N into contact with the fixed friction-disk N′ to finally bring the main shaft G to a stop, and consequently the machine to a rest, at the time the cross-head B reaches the end of its upward stroke. The operator now shifts the wood relative to the cutting-tools C, and the above-described operation is then repeated.

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

1. The combination with a forward and backward driving gear, and a shifting-lever for the same, of a hand-lever, a link connecting the said hand-lever with the said shifting-lever, a friction stopping device for the said driving-gear, independent of the said hand-lever and the said shifting-lever, and a sectional link connected with the said friction stopping device and adapted to be opened by the action of the said hand-lever, for throwing the friction stopping device out of action at the time the hand-lever is pressed by the operator and the shifting-lever is moved from the normal inactive position to an active position.

2. A frictional brake comprising a friction stopping device, a sectional link connected with the said stopping device, a cam device and a movable part of the machine, on which the brake is applied, the said movable part controlling the said cam device for imparting movement to the said sectional link, to actuate the stopping device.

3. A friction-brake for the driving-shaft of a machine comprising a shaft, a fixed friction member, a movable friction member adapted to engage the fixed friction member and mounted to slide on and to turn with the said shaft, a shifting-lever engaging the said movable friction member to move the latter into or out of contact with the said fixed friction member, a sectional link connected with the said shifting-lever and a hand-lever under the control of the operator for opening the said sectional link to move the said movable friction member out of contact with the said fixed friction member.

4. A friction-brake for the driving-shaft of a machine comprising a shaft, a fixed friction member, a movable friction member adapted to engage the fixed friction member and mounted to slide on and to turn with the said shaft, a shifting-lever engaging the said movable friction member to move the latter into or out of contact with the said fixed friction member, a sectional link connected with the said shifting-lever, a swing-arm connected with the said sectional link and a movable part on the said machine for engaging the said

swing-arm to impart movement to the said sectional link and to the said shifting-lever for the latter to move the said movable friction member into contact with the said fixed friction member.

5. A friction-brake for the driving-shaft of a machine comprising a fixed friction member, a movable friction member adapted to engage the fixed friction member and mounted to slide on and to turn with the said shaft, a shifting-lever engaging the said movable friction member to move the latter into or out of contact with the said fixed friction member, a sectional link connected with the said shifting-lever, a swing-arm connected with the said sectional link and provided with a spring-pressed lever carrying a friction-wheel and a cam on a movable part of the machine for engaging the said friction-roller.

6. The combination with a shaft, clutch-pulleys mounted to turn loosely in opposite directions on the said shaft, a double clutch for engaging either of the said clutch-pulleys and mounted to slide on and to turn with the said shaft, and a shifting-lever for the said double clutch, of a fixed friction member, a movable friction member for engaging and disengaging the said fixed friction member the said movable friction member being mounted to slide on and to turn with the said shaft, a shifting-lever for the said movable friction member, a sectional link connected with the said shifting-lever for the movable friction member, and a hand-lever connected with the said shifting-lever for the double clutch and adapted to open the said sectional link.

7. The combination with a shaft, clutch-pulleys mounted to turn loosely in opposite directions on the said shaft, a double clutch for engaging either of the said clutch-pulleys and mounted to slide on and to turn with the said shaft, and a shifting-lever for the said double clutch, of a fixed friction member, a movable friction member for engaging and disengaging the said fixed friction member, the said movable friction member being mounted to slide on and to turn with the said shaft, a shifting-lever for the said movable friction member, a sectional link connected with the said shifting-lever for the movable friction member, a swing-arm connected with the said sectional link, a part receiving motion from the said shaft for acting on the said swing-arm, and a hand-lever for connection with the shifting-lever for the said double clutch and for opening the said sectional link.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE A. ENSIGN.

Witnesses:
GEO. W. DEATRICK,
JOS. BAUER.