No. 796,194. PATENTED AUG. 1, 1905.

F. A. DAY.

WOOD HEEL CONCAVING MACHINE.

APPLICATION FILED APR. 20, 1904.

4 SHEETS—SHEET 1.

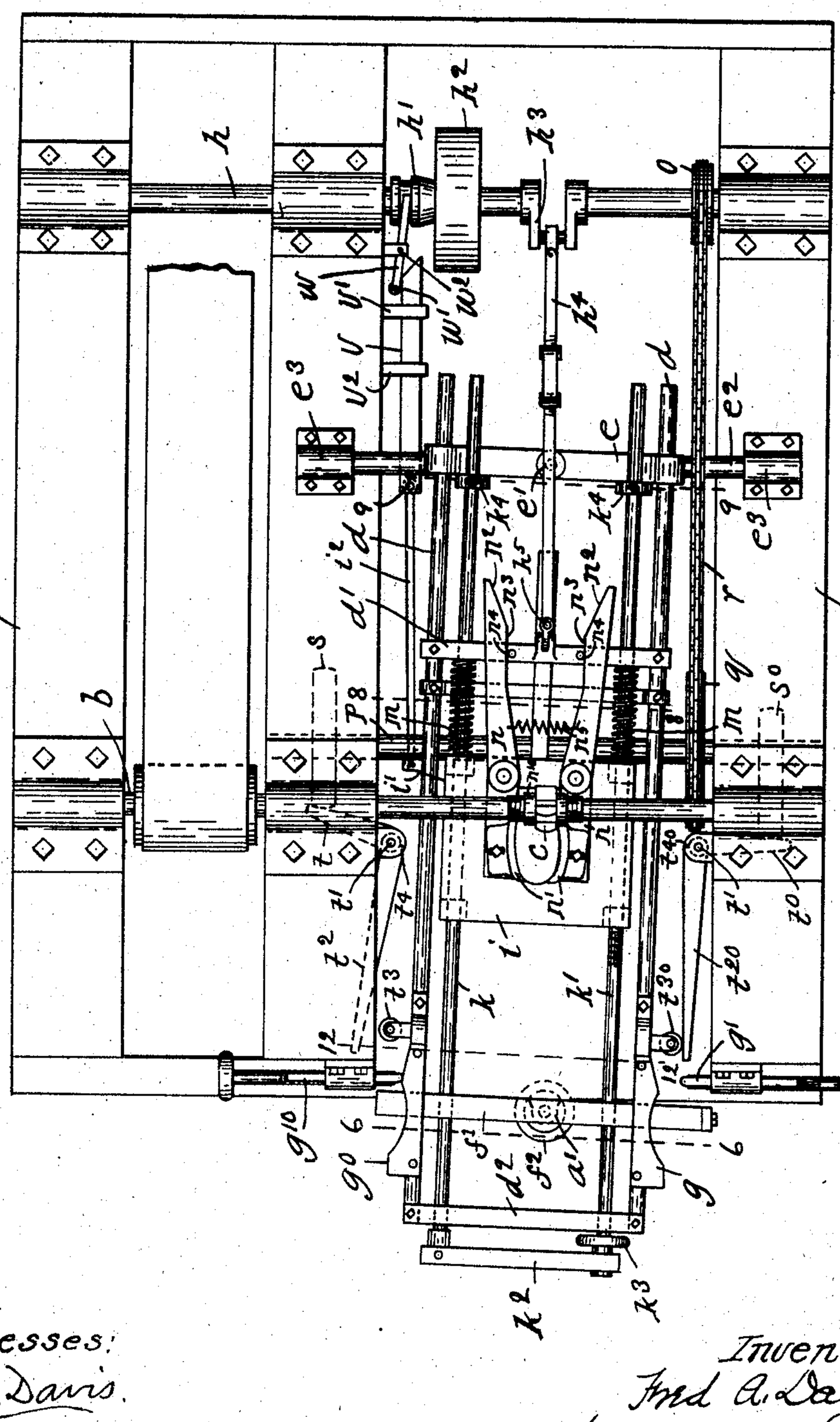

Fig. 1.

Witnesses:
H. B. Davis.
D. H. Howard.

Inventor
Fred A. Day
by Noyes & Hamman
Attys

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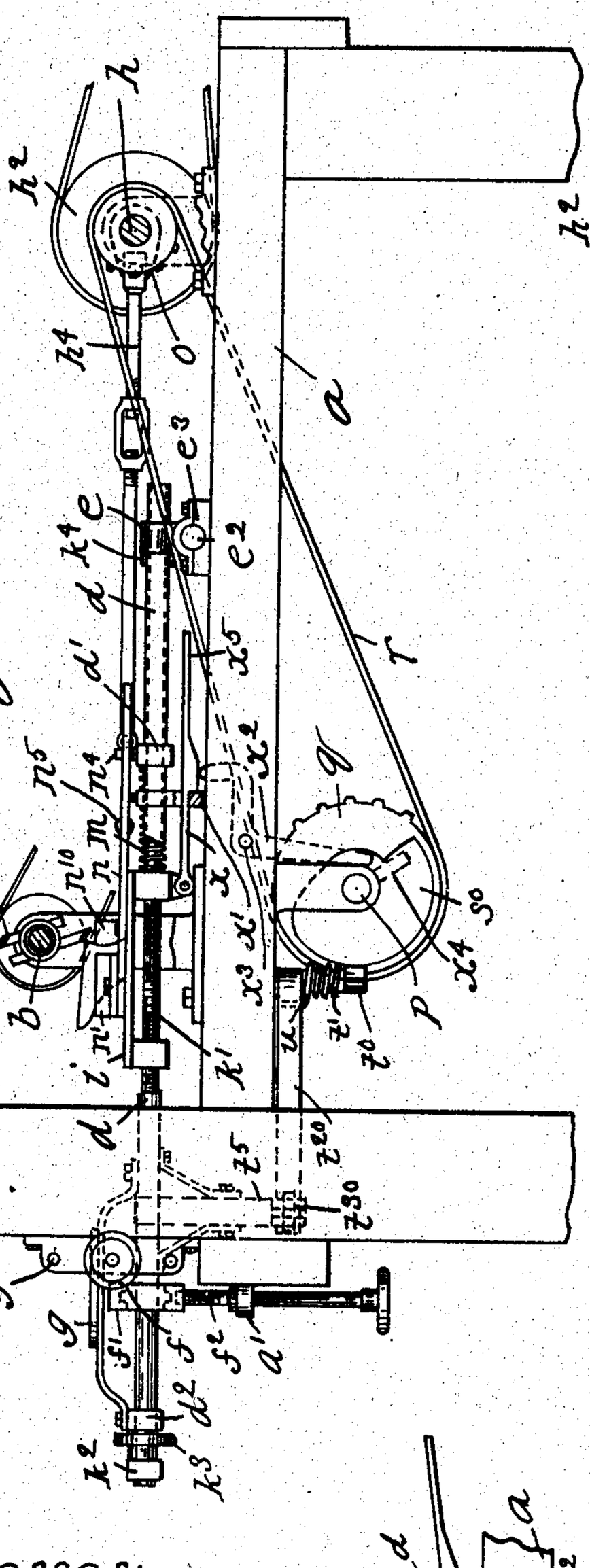

Fig. 2.

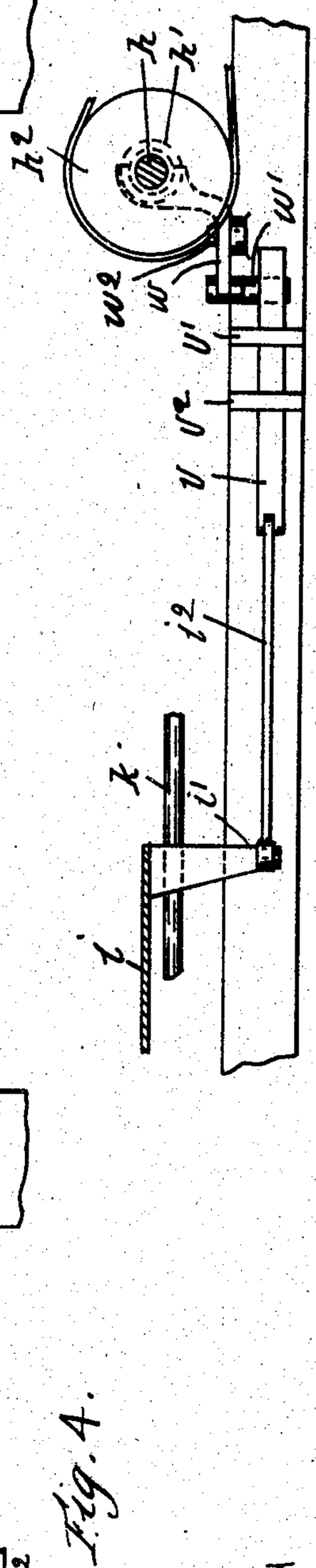

Fig. 3.

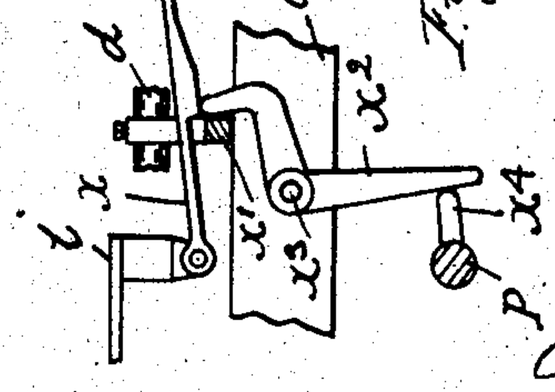

Fig. 4.

Witnesses:
H. B. Davis.
D. A. Howard.

Inventor:
Fred A. Day
by Wright Brown Hammond
Attys.

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

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4 SHEETS—SHEET 3.

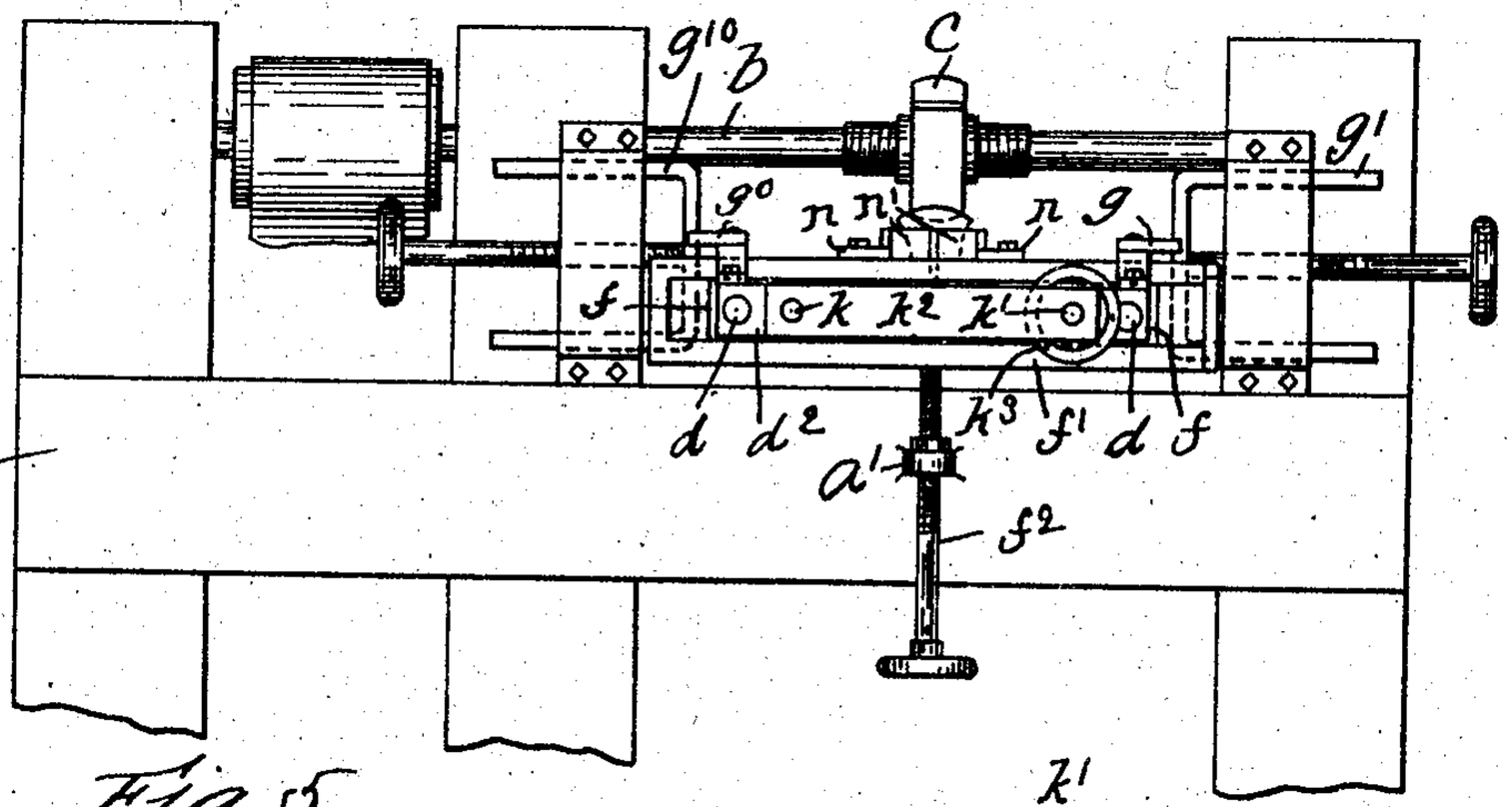

Fig. 5.

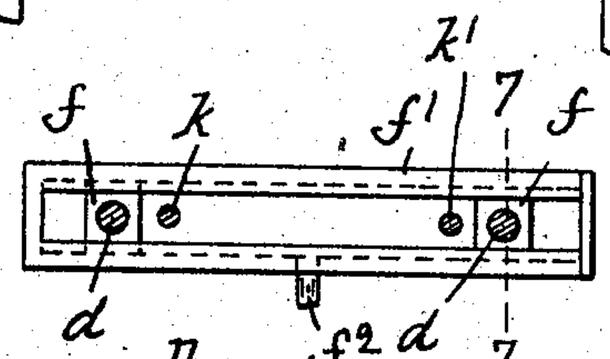

Fig. 6.

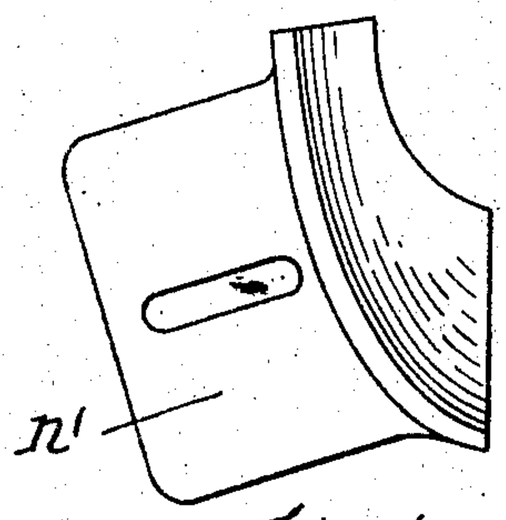

Fig. 10.

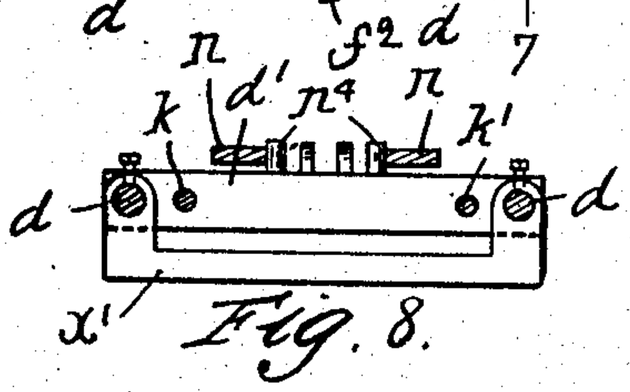

Fig. 8.

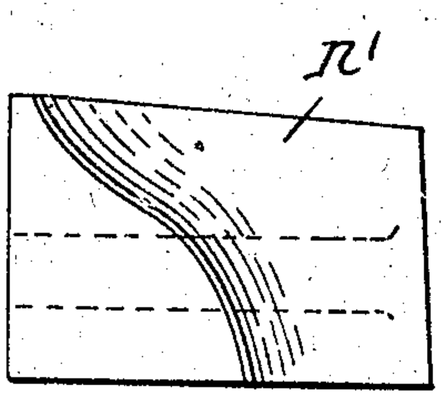

Fig. 11.

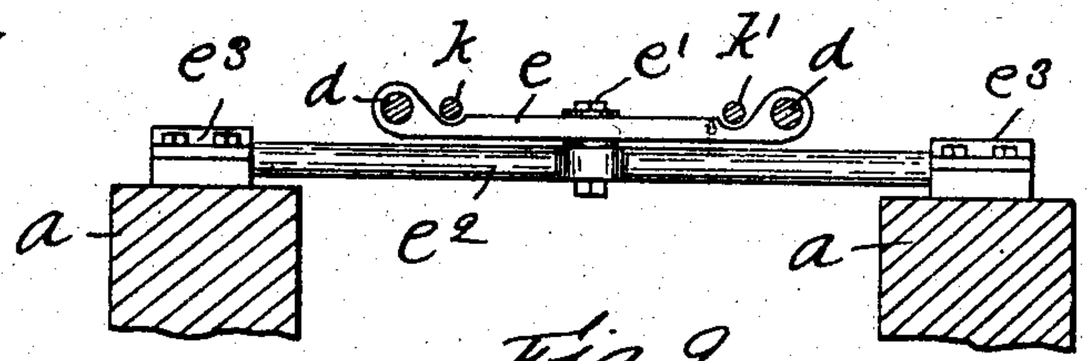

Fig. 9.

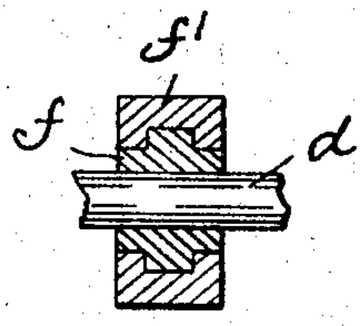

Fig. 7.

Witnesses:
H. B. Davis.
D. A. Howard.

Inventor:
Fred A. Day.
By Noyes & Kamman
Attys

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WOOD HEEL CONCAVING MACHINE.

APPLICATION FILED APR. 20, 1904.

4 SHEETS—SHEET 4.

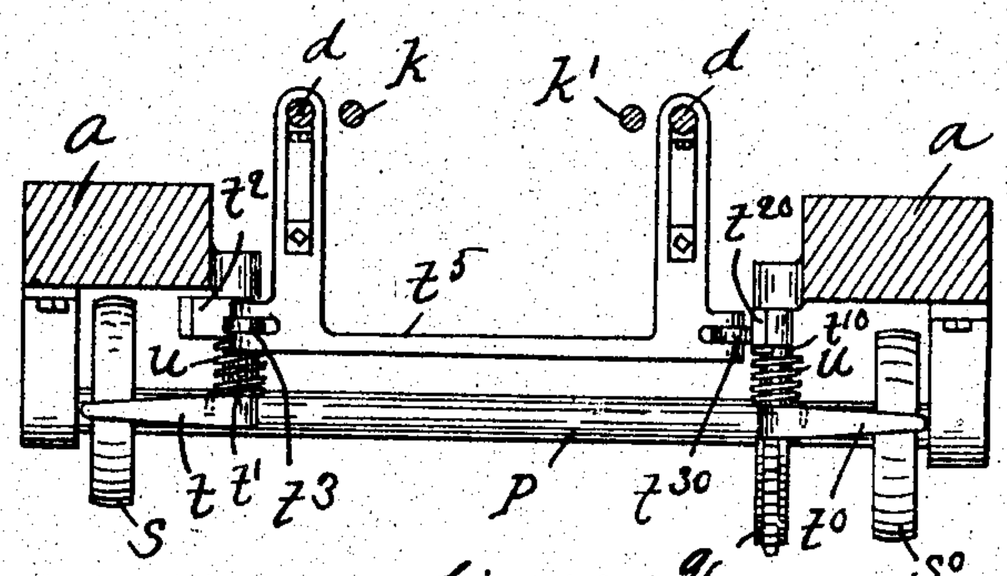

Fig. 12.

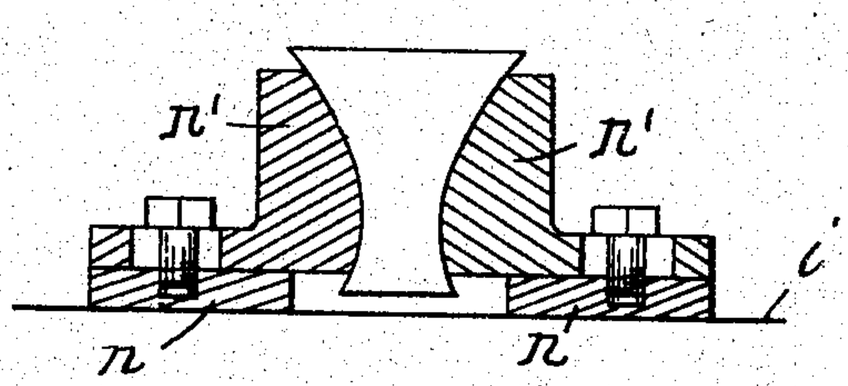

Fig. 13.

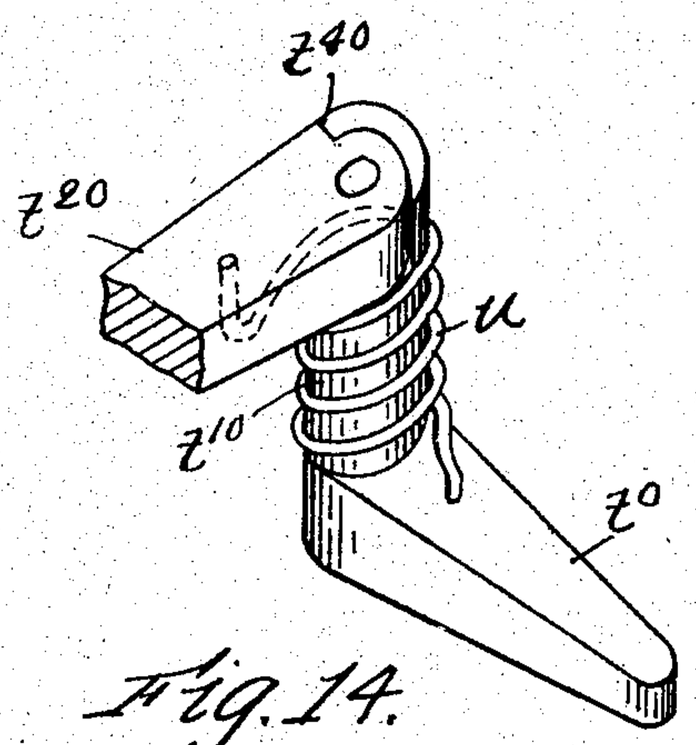

Fig. 14.

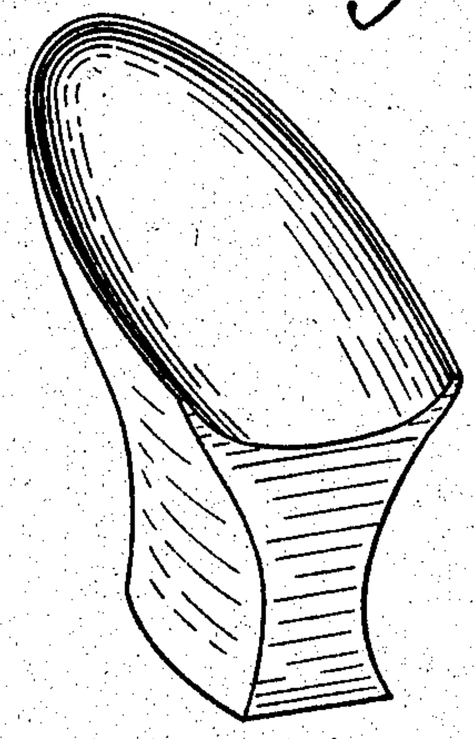

Fig. 15.

Witnesses:
H. B. Davis.
D. A. Howard.

Inventor:
Fred A. Day
by Noyes & Lamman
Attys.

UNITED STATES PATENT OFFICE.

FRED A. DAY, OF HAVERHILL, MASSACHUSETTS.

WOOD-HEEL-CONCAVING MACHINE.

No. 796,194. Specification of Letters Patent. Patented Aug. 1, 1905.

Application filed April 20, 1904. Serial No. 204,004.

To all whom it may concern:

Be it known that I, FRED A. DAY, of Haverhill, county of Essex, State of Massachusetts, have invented an Improvement in Wood-Heel-Concaving Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to machines for concaving the upper sides of wood heels, and has for its principal objects to provide a machine which will do this work automatically, accurately, and rapidly and to reduce the amount of breakage which usually takes place during this operation.

In the drawings, Figure 1 is a plan view of a machine made according to my invention. Fig. 2 is a side view thereof. Fig. 3 is a detail view of the clutch mechanism. Fig. 4 is a detail view of the unlocking mechanism. Fig. 5 is a front elevation. Fig. 6 is a cross-sectional view in detail on the line 6 6 of Fig. 1. Fig. 7 is a detail view on the line 7 7 of Fig. 6. Fig. 8 is a detail view on the line 8 8 of Fig. 1. Fig. 9 is a detail view on the line 9 9 of Fig. 1. Figs. 10 and 11 are detail plan and side views of one of the clamping members. Fig. 12 is an enlarged cross-sectional view on the line 12 12 of Fig. 1. Fig. 13 is an enlarged cross-sectional view of the heel-clamp. Fig. 14 is a detail perspective view of a part of one of the carriage-swinging levers. Fig. 15 is a perspective view of a finished heel.

The frame a is of any suitable or convenient form, and a shaft b is journaled thereon. A cutter c is mounted on said shaft, the blades of which are suitably shaped for the especial purpose of concaving the top of a wood heel.

Two parallel rods d are reciprocally mounted in a bearing-piece e, which is centrally pivoted on a bolt e', said bolt being secured in a rocking shaft e^2, which is journaled in bearings e^3, mounted on the frame. (See Figs. 1, 2, and 9.) Said rods d are rigidly connected by a cross-bar d', adjacent the rear ends thereof, and by a cross-bar d^2 at their front ends. Said rods d are also reciprocally mounted in bearing-blocks f, said blocks f being slidably mounted in a frame f', having ways formed therein by oppositely-arranged grooves, as shown in Fig. 7. Said frame f' is supported in the middle thereof by an adjusting-screw f^2, which is threaded in a suitable lug a' on the frame, said screw f^2 forming a pivotal bearing for said frame and providing a means whereby the front end of the carriage, which is formed by said rods d and their connecting parts, may be raised or lowered. When said carriage is swung about the pivot, the frame f' will swing upon screw f^2 as a centre, and said blocks f will slide in the frame to permit such movement. A pair of cam-plates g g^0 are secured to the rods d, at oppositely-arranged points thereon, said plates being adapted to engage the adjustable stops g' g^{10}, mounted on the frame, and to limit the lateral swinging movement of said carriage about the pivot-bolt e'.

A crank-shaft h is rotatably mounted in the frame, said shaft having a clutch-cone h' splined thereon and a clutch-pulley h^2 journaled thereon, said pulley being constantly driven, so that when said cone is thrown into engagement therewith the shaft h will be rotated. A crank h^3 is provided on the shaft, and a connecting-rod h^4 is connected to said crank and to the cross-bar d' by a double joint h^5.

A clamp-holder i is mounted upon a pair of parallel rods $k k'$, which pass therethrough, said holder having a threaded connection with the rod k' and having a sliding connection with the rod k. The rod k is secured at its front end to a cross-bar k^2, and the rod k' is journaled in said cross-bar k^2, but held from longitudinal movement therein. A hand-wheel k^3 is secured to the rod k^2, so that the position of said holder i on the rods k k' may be adjusted. A pair of springs m are provided on the rods k k', said springs being interposed between the rear end of the holder i and the adjacent side of the cross-bar d'. A pair of clamping-levers n are pivoted on the pins n^0, mounted in the holder i, the front ends of said levers being provided with clamping-jaws n' on their adjacent edges, and the rear ends of said levers being provided with oppositely-inclined cam-faces n^2 and straight portions n^3, the rear ends of said levers being drawn together by a spring n^5, and said faces being constantly held against vertical pins n^4, rigidly mounted in the cross-bar d'. Said parts are arranged so that when the holder i is pushed rearwardly until the stops k^4 on the rods k k' engage the cross-bar e the jaws n' of the levers n will be thrown together by

the pins n^4 and held in this position as soon as said pins n^4 bear against the straight portions n^3 of the levers.

The jaws n' are removable, and their faces are made of readily-fusible metal, as solder, and are cast so that they fit the sides of the particular series of heels which are to be concaved, said jaws being of such width that they grasp the heel from a point near the bottom to a point closely adjacent the top and from points near the front to the back thereof, thus centering the heel by the shape of the sides near the top. The heel is not supported or centered at all by its bottom surface, so that any inaccuracy in this surface will not affect the position in which the heel is clamped. A heel breast-stop n^{10} is secured on the holder i, said stop coöperating with the jaws n' in holding the heel. This particular form of heel-clamp is of special importance, for the reason that it not only centers the heel, so that the cutter may be uniformly guided close to the edge of the top of the heel, leaving an edge at the corner of uniform width, but it also relieves all strain which might otherwise be placed upon the waist or narrow portion of the heel if the heel were clamped or held by its bottom portion, thereby greatly decreasing the amount of breakage.

A sprocket-wheel o is mounted on the shaft h, and a cam-shaft p is journaled in the frame and provided with a sprocket-wheel q in line with the sprocket-wheel o, a chain r passing over said wheels. The sprocket-wheel q has twice as many teeth as the wheel o, so that the shaft p will make one rotation to every two of the shaft h. A pair of cams s^0 s are mounted on the shaft p at opposite sides of the carriage in position to engage the outer ends of arms t^0 t, said arms being pivoted on vertical pins t' at their inner ends and normally extending in the general direction of the shaft p. Upwardly-extending hubs t^{10} are formed on the ends of each arm t^0 t, through which pins t' pass, and arms t^2 t^{20} are also pivoted on pins t', said arms extending longitudinally of the carriage toward the front in position to engage rolls t^3 t^{30}, mounted on opposite sides of a yoke t^5, secured to rods d of the carriage. The upper ends of hubs t^{10} are provided with shoulders t^4 t^{40}, against which corresponding shoulders on the arms t^2 t^{20} may bear, thereby limiting the extent to which the arms t^2 t^{20} may be swung in one direction with relation to arms t t^0. A spring u encircles the hubs t^{10} of each arm t t^0, the ends of said springs being connected, respectively, to said arms t t^0 and their corresponding arms t^2 t^{10}. Said arms t t^2 and t^0 t^{20} coöperate to form bell-crank levers, the arms of which may yield with relation to each other in one direction, the springs u thereof acting normally to hold the shoulders of the arms t^2 t^{20} against the shoulders t^4 t^{40} of the hubs.

The holder i is provided with a lug i', and a link i^2 is pivotally connected to said lug at one end and to a bar v at its other end. Said bar v is reciprocally mounted in lugs v^2 on the frame, and the rear end of said bar is provided with an inclined face, which is adapted to engage a roll w' on one end of a shipping-lever w, which is pivoted on a pin w^2, secured on the frame, the opposite end of said shipping-lever being forked and adapted to engage the clutch-cone h'.

A latch x is pivotally connected to the rear end of holder i, said latch being adapted to fall into engagement with a yoke x', which is adjustably secured to the rods d of the carriage when said holder is in its rearmost position on the carriage, as shown in Figs. 1 and 2. A bell-crank lever x^2 is pivoted at x^3 on the frame, and a finger x^4 is secured to the shaft p in position to engage one arm of said lever. The other arm of the lever is in position to lift the latch x out of engagement with yoke x' when said arm is swung upward by finger x^4 upon rotation of shaft p, the width of said latch being such that said lever may engage said latch in all positions of the carriage.

The operation of the above-described machine is as follows: The latch x having been lifted out of engagement with yoke x' the springs m will slide the holder i forwardly until the jaws n' are separated to permit the removal of the finished heel. In this position the bar v will be drawn back out of engagement with the shipping-lever w, so that the crank-shaft h will be stationary and the latch x will be supported by its rear-end portion x^5, which will then be resting upon the yoke x'. The cutter-shaft b will be constantly rotated. The operator removes the finished heel from between the clamping-jaws and places another heel therebetween and then presses inward upon the bar k^2, causing the rods k k' and holder i' to slide on the carriage, carrying the levers n rearwardly, so that they slide upon the holding-pins n^4 and cause the clamping-jaws n' to be brought together so as to engage and hold the heel firmly therebetween, as shown in Fig. 13. As the holder is pressed rearwardly the springs m will be compressed, and by the time the heel is firmly grasped by jaws n' the latch x will have fallen into engagement with the yoke x', so that said springs m cannot push back the holder and unlock the clamp, the stop-lugs k^4 at the same time engaging the bar e. The rearward movement of the holder i causes the bar v to slide rearwardly and the latter, acting upon the shipping-lever w, will throw the clutch h' into engagement with the pulley h^2, causing the shaft h to be rotated. The cam-shaft p will then be driven by chain r and the cam s^0 will engage the arm t^0 and swing it forward, and said arm, acting through spring u, will then cause arm t^{20} to engage the roll t^{30} of the carriage and swing the latter upon its pivot e' until the cam-plate g^0 on the opposite side

of the carriage is pressed against its stop g^{10}. The carriage will then be drawn rearwardly by the crank-shaft h, so that the heel will be drawn under and into engagement with the cutter, the cutter acting to concave one side portion of the heel as the carriage is drawn rearward. During this rearward movement the cam s^0, through the intermediate mechanism, will hold cam-plate g^0 against its stop g^{10}, the shape of the cam-plate being such that the carriage will be swung so that the heel will be concaved close to its sides, leaving a narrow edge of uniform width, as shown in Fig. 15. If the shapes of the cam s^0 and plate g^0 do not happen to correspond, such variations will be compensated for by the intermediate spring u. This arrangement permits the plates g g^0 to be varied according to different heels without changing the cams s s^0. The carriage will be carried rearward until the side portion of the heel opposite that toward which the carriage was swung is finished to the back side thereof, and then the carriage will be pushed toward the front again by the crank-shaft. As soon as the return movement begins the radial face on the cam s^0 will pass the arm t^0 and pass out of contact therewith, so that arm t^{20} will no longer be pressed against the roll t^{30}. At the same time the higher part of the cam s will engage the arm t, causing arm t^2 to engage roll t^3 and swing the carriage in the opposite direction, so that the cutter will remove some of the center portion of the heel during the return movement. By the time the crank-shaft starts to draw the carriage rearwardly again the cam s will have moved the cam-plate g into engagement with its stop g', the carriage being swung to the opposite side of its middle position from that shown in Fig. 1. As the heel is drawn under the cutter its opposite side will be concaved in the manner before described, and the concaving process will then be finished. As soon as the second rearward movement of the carriage has been finished the finger x^4 on the shaft p will engage the vertical arm of lever x^2, swinging it rearwardly and swinging its horizontal arm upwardly, lifting the latch x out of engagement with the yoke x', as shown in Fig. 4, and permitting the springs m to force back the holder i to a position in which the heel-clamp will be unlocked, so that the finished heel may be removed. This forward movement of the holder will withdraw the bar v from the shipping-lever w, causing the clutch h' to be thrown out of action, so that shaft h will stop.

The parts are so adjusted and timed that all parts except the cutter and cutter-shaft will come to rest when the carriage has been carried to the forward limit of its movement. While this is taking place the operator will be removing the finished heel and placing another heel in the clamp, and then he will push the holder inwardly again, and the above-described operation will be repeated. This arrangement will enable a heel to be concaved so rapidly that the shaft h will be rotating almost continuously, as the quick return of the holder to unlock the clamp, which is made by springs m, enables the operator to have the next heel in place by the time the carriage reaches its forward position.

The holder-plate i must be adjusted so that when it is pushed into its rearmost position the rearward movement of the carriage will not be sufficient to carry the heel back so far that the cutter will cut beyond the back side of the heel. Such adjustment is provided for by the threaded rod k^2, and in case said holder is adjusted yoke x' and stops k^4 must be correspondingly adjusted.

The parts are adjusted and arranged so that it is impossible to move the clamping-jaws beneath the cutter while they are even partly unlocked, thereby avoiding all possibility of the heel being engaged by the cutter when it is not firmly held on the holder.

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

1. A machine for concaving wood heels comprising a rotatable cutter, a carriage, and means for reciprocating the same longitudinally beneath the cutter, a heel-holder mounted on said carriage having a pair of clamping members, and means for moving said members together to clamp the heel, operated upon movement of said holder toward the cutter, substantially as described.

2. A machine for concaving wood heels comprising a rotatable cutter, a carriage, and means for reciprocating the same longitudinally beneath the cutter, a heel-holder mounted on said carriage and movable longitudinally thereof, said holder having a pair of clamping members, means on said carriage for moving said members together to clamp the heel as said holder is moved on the carriage toward the cutter, and means for separating said members as said holder is moved on the carriage in the opposite direction, substantially as described.

3. A machine for concaving wood heels comprising a rotatable cutter, a heel-holder, means for reciprocating said holder longitudinally beneath the cutter and means permitting transverse movement thereof to opposite sides of a middle position during successive reciprocations, and guiding-stops at opposite sides of said middle position for limiting the transverse movement of the holder in all longitudinal positions thereof, substantially as described.

4. A machine for concaving wood heels comprising a rotatable cutter, a heel-holder, means for reciprocating said holder longitudinally beneath the cutter and yielding actuating means for moving it transversely to opposite sides of a middle position during suc-

cessive reciprocations thereof, and guiding-stops at opposite sides of said middle position for limiting its transverse movement, substantially as described.

5. A machine for concaving wood heels comprising a rotatable cutter, a reciprocally-mounted heel-holder, a crank-shaft and a connecting-rod for reciprocating said holder longitudinally, means permitting transverse, horizontal, swinging movement of said holder while it is being reciprocated, and guiding-stops at opposite sides of the middle position of the holder for limiting the extent of its swinging movement, substantially as described.

6. A machine for concaving wood heels comprising a rotary cutter, a reciprocally-mounted carriage having a heel-holder thereon, driving mechanism for reciprocating said carriage, means for disconnecting said carriage and driving mechanism at the end of every two reciprocations of said carriage and means for moving the carriage transversely to one side of a middle position during one reciprocation, and to the other side thereof during the other reciprocation, substantially as described.

7. A machine for concaving wood heels comprising a rotary cutter, a longitudinally and transversely movable carriage, a heel-clamp thereon, driving mechanism for reciprocating said carriage and means for disconnecting the carriage therefrom when it has been reciprocated a predetermined number of times, means for locking said heel-clamp, and means for unlocking said clamp simultaneously with the disconnection of the carriage from said driving mechanism, substantially as described.

8. A machine for concaving wood heels comprising a rotary cutter, a reciprocally-mounted carriage, a heel-clamp holder reciprocally mounted on said carriage, locking and unlocking means for the clamp of said holder respectively operated upon movement of said holder in opposite directions on the carriage, driving mechanism for reciprocating said carriage, clutch mechanism for throwing said driving mechanism into and out of action, means connected to said holder for operating said clutch mechanism to throw the same into action when the holder is moved to lock its clamp, and out of action when the holder is moved to unlock its clamp, substantially as described.

9. A machine of the character described comprising a cutter, a reciprocally-mounted carriage, a clamp thereon, driving mechanism for reciprocating said carriage, clutch mechanism for throwing said driving mechanism into and out of action, means for opening and closing said clamp and means connected thereto for operating said clutch mechanism to throw the same into action when the clamp is closed and out of action when it is opened, substantially as described.

10. A machine for concaving wood heels comprising a rotary cutter, a reciprocally-mounted carriage beneath the cutter, a clamp-holder reciprocally mounted on said carriage, means for closing the clamp of said holder when the holder is moved on the carriage toward the cutter, and for opening the same when the holder is moved thereon in the opposite direction, means for reciprocating said carriage and means for moving said holder away from the cutter to unlock said clamp after a predetermined number of reciprocations of said carriage, substantially as described.

11. A machine for concaving wood heels comprising a rotary cutter, a reciprocally-mounted carriage beneath the cutter, a clamp-holder reciprocally mounted on said carriage, means for closing the clamp of said holder when the holder is moved on the carriage toward the cutter and for opening the same when the holder is moved thereon in the opposite direction, driving mechanism for reciprocating said carriage, clutch mechanism for throwing said driving mechanism into and out of action, means for moving said holder away from the cutter to unlock said clamp after a predetermined number of reciprocations of said carriage, and means for simultaneously operating said clutch mechanism to throw said driving mechanism out of action, substantially as described.

12. A machine for concaving wood heels comprising a rotary cutter, a longitudinally and transversely movable carriage, a heel-clamp thereon, driving mechanism for reciprocating said carriage, cam mechanism for moving said carriage transversely in opposite directions in time with the reciprocations of said carriage, and having a yielding connection with said carriage, and oppositely-located cam-plates for limiting the transverse movement of said carriage while it is being reciprocated, substantially as described.

13. A machine for concaving wood heels comprising a rotary cutter, a longitudinally and transversely movable carriage, a crank-shaft for reciprocating said carriage, a cam-shaft and means carried thereby for moving said carriage transversely to one side of an intermediate position and then to the other side of said position and return during a single rotation of said cam-shaft, and connections between said shafts whereby said cam-shaft makes a single rotation to every two of the crank-shaft, substantially as described.

14. A machine for concaving wood heels comprising a rotary cutter, a carriage, a support on which said carriage is reciprocally mounted beneath the cutter, a crank-shaft for reciprocating said carriage, a heel-holder slidably mounted on said carriage having a pair of clamping-jaws thereon, means carried by said carriage for moving said jaws together to clamp the heel as said holder is moved on the carriage toward said cutter and for separating them to unclamp it as the holder is moved in the opposite direction, a spring for

moving said holder on the carriage away from the cutter, a latch for locking the holder against movement by said spring, and means, operated by said crank-shaft, for lifting said latch after a predetermined number of reciprocations of said carriage, substantially as described.

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

FRED A. DAY.

Witnesses:
L. H. HARRIMAN,
H. B. DAVIS.