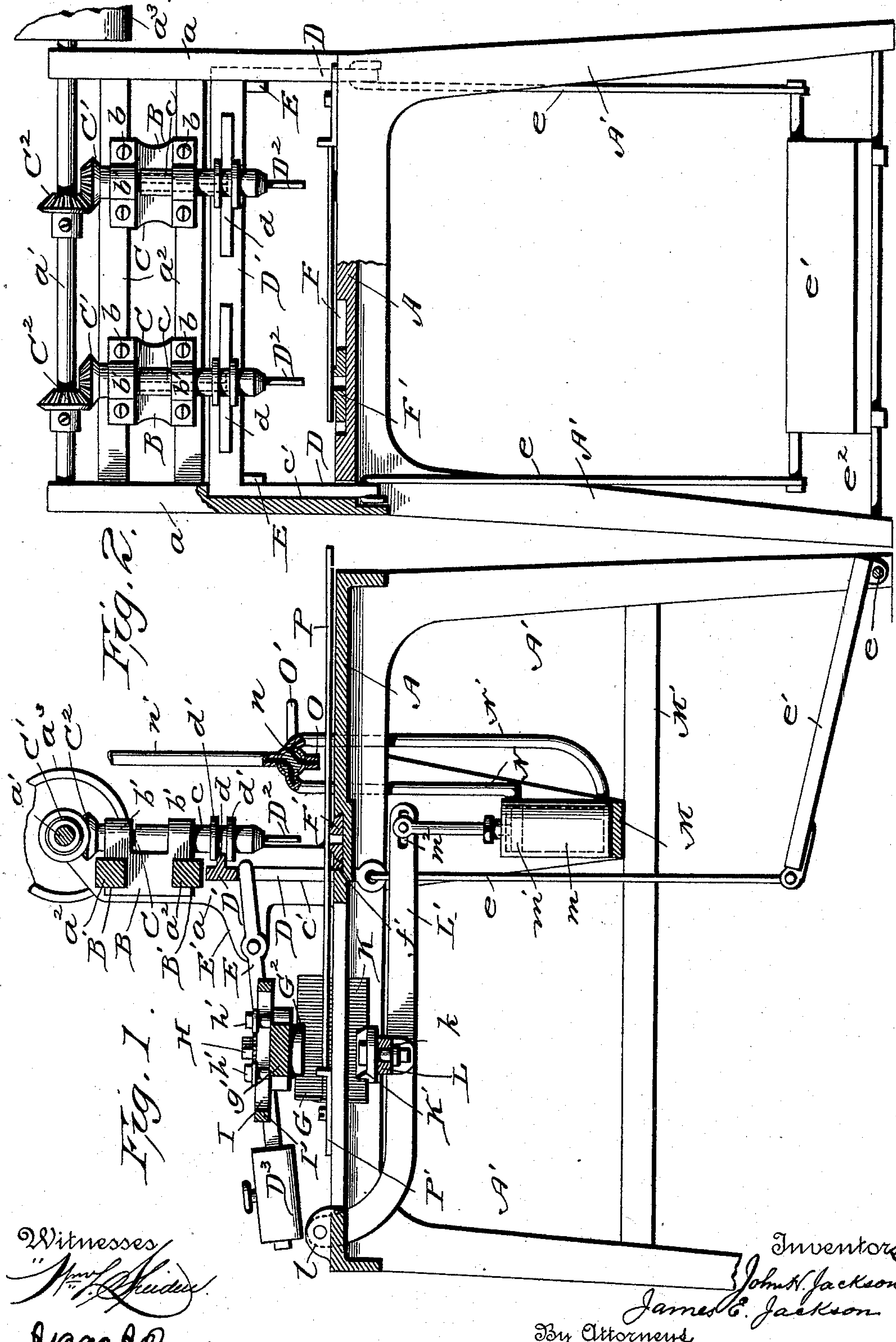
(No Model.) 2 Sheets—Sheet 1.

J. H. & J. E. JACKSON.

MACHINE FOR TRIMMING AND PERFORATING SLATE.

No. 540,316. Patented June 4, 1895.



Witnesses:
Wm. J. Snider
Isaac R. Owens.

Inventors:
John H. Jackson
James E. Jackson
By Attorneys
De Bois & De Bois

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

J. H. & J. E. JACKSON.

MACHINE FOR TRIMMING AND PERFORATING SLATE.

No. 540,316. Patented June 4, 1895.

Fig. 3.

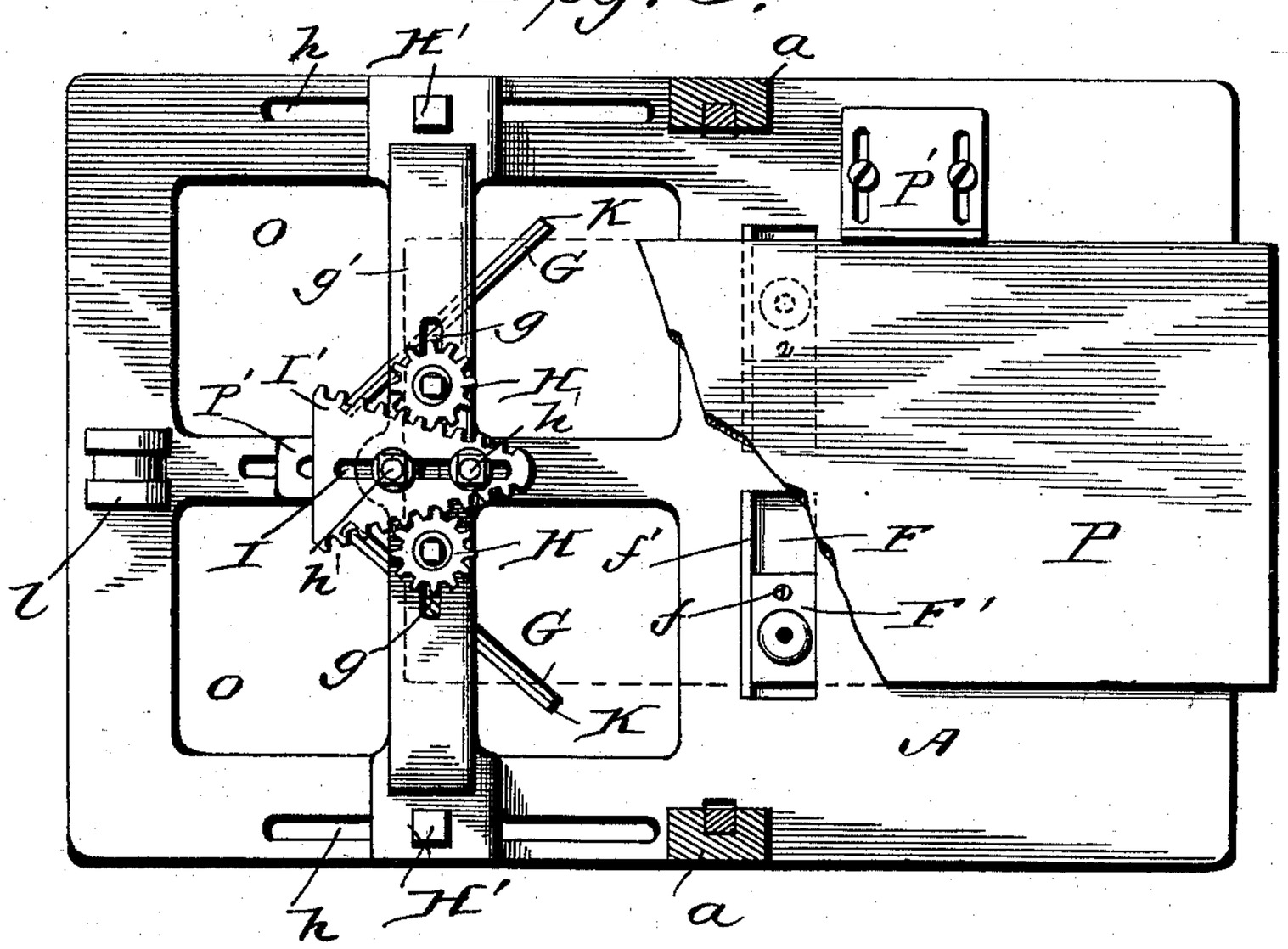


Fig. 4.

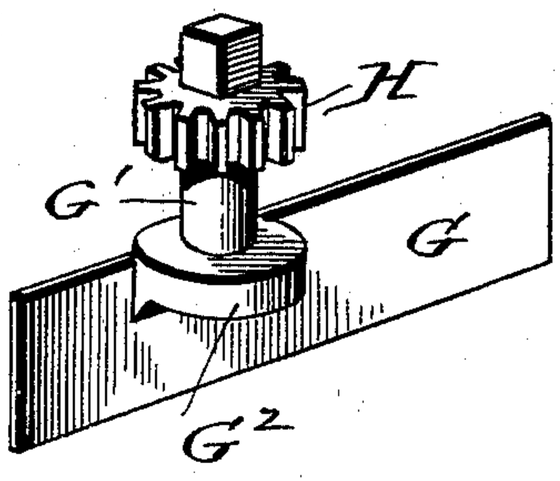
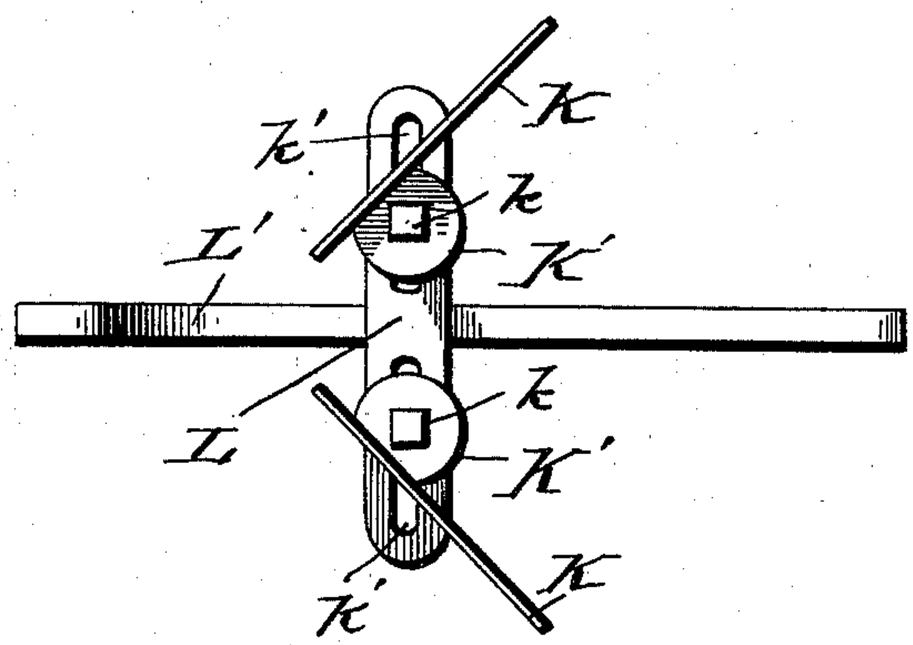


Fig. 5.



Witnesses
Wm. F. Lindau.
Isaac B. Owens.

Inventors:
John H. Jackson,
James E. Jackson.
By Attorneys.
Dewey & Dewey

UNITED STATES PATENT OFFICE.

JOHN H. JACKSON AND JAMES E. JACKSON, OF PEN ARGYL, PENNSYLVANIA.

MACHINE FOR TRIMMING AND PERFORATING SLATE.

SPECIFICATION forming part of Letters Patent No. 540,316, dated June 4, 1895.

Application filed October 16, 1893. Serial No. 488,294. (No model.)

To all whom it may concern:

Be it known that we, JOHN H. JACKSON and JAMES E. JACKSON, citizens of the United States, residing at Pen Argyl, in the county of Northampton and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Trimming and Perforating Slate; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to an improvement in machines for perforating and dressing roofing slate.

My object is to provide a machine which will dress the edges of the slate into suitable shapes, and simultaneously bore or punch countersunk holes therein for the purposes, in the manner, and by the means more fully described hereinafter.

Referring to the accompanying drawings, Figure 1 represents a longitudinal section of the machine; Fig. 2, an end elevation partly in section; Fig. 3, a horizontal section; Fig. 4, a detail of the stationary trimming-knives, and Fig. 5 a plan view of the movable or shearing knives.

The operative parts of the machine are mounted upon the metallic table A, and this is in turn supported by the legs A′, which are by preference formed integral therewith.

The machine comprises two parts, viz: the perforating or drilling mechanism and the trimming mechanism, both of which will be described in their turn, and the drilling mechanism first. This is mounted upon the vertical standards *a*, which may be formed integral with the table or rigidly secured thereto and which have mounted in their upper ends the revolving drive shaft *a′*, driven by a power pulley a^3, in belt connection with any suitable source of power, preferably a steam engine. Secured between the standards *a*, and in a vertical line with each other are the guide bars a^2 between which are arranged the sliding boxes B. These boxes are two in number and are provided each with the grooves or recesses B′ which snugly clasp the guide bars a^2, and which allow the boxes to be moved laterally along the bars; set screws *b*, being employed and arranged in each of the boxes whereby they may be fixed in the proper position. Each of the boxes B, is provided with two bearings *b′* in vertical alignment with each other and of substantially the same size bore, though this latter arrangement is not essential. The upper bearing of each box B, is adapted to receive and hold the spindle C, to the upper end of which spindle is fixed the bevel pinions C′. The pinions C′ mesh with the corresponding pinions C^2 on the drive shaft *a′* and by this means a continuous rotary motion is imparted to the spindles C. That portion of the spindles C, which is located below the upper boxes is formed square in cross-section and of the same thickness throughout its length. Upon these squared portions the hollow drill spindles or sleeves *c*, are arranged so as to be capable of an independent longitudinal movement and incapable of an independent rotary movement. The drill spindles *c*, are of course two in number, journaled in the lower of the boxes B, and provided at their lower ends with suitable drills D^2.

Formed on the inner sides of each of the standards *a*, and extending upwardly to a point just below the boxes B, are the vertical seats or ways *c′*, in which are arranged and adapted to reciprocate the rods D. These rods have their upper ends formed integral with the cross bar D′ and this cross bar extends directly under the lower of the guide bars a^2.

Secured to or formed integral with the cross bar D′ are two feathers or ribs *d*, which are adapted to be received between the collars *d′* formed on each side of the drill spindles *c*. The ribs *d* are made elongated so as to admit the lateral adjustment of the drills and yet subject them to the influence of the ribs. The purpose of the bar D′ is to keep the drills normally raised and to allow them to be lowered at the will of the operator. To this end I provide the levers E, which are by preference two in number and fulcrumed to an offset E′ formed integral with each of the standards *a*, with their short arms so arranged that they will bear against the under side of the bar D′.

Fixed to the long arm of the levers E, are the adjustable weights D^3 which operate to

lift the short arms of the levers E, and to keep the bar D′ normally up as far as the ways *c′* will admit.

Attached to the lower ends of the rods D are the connecting rods *e*, which are one for each of the rods D, and which are connected at their lower ends to a treadle *e′* pivoted in turn to the bar e^2 of legs A′. By operating this treadle, *e′*, the rods D, will be made to move downwardly in their respective ways and this will be followed by a downward movement of the cross bar D′, against the tendency of the weighted levers E, and a consequent downward movement of the revolving drill spindles. Thus the drills are normally kept out of engagement with their work and made to engage it at the will of the operator.

Arranged in the independent laterally elongated ways F, in the face of the table A, are the die blocks F′ which are movable laterally in the ways and may be firmly secured therein by the set screws *f*, and wedges *f′*. These latter devices may however be dispensed with. By this construction it will be seen that the die blocks may be adjusted to correspond with the position assumed by the drills. By reference to Fig. 1 it will be seen that by reason of the die blocks F′, projecting slightly above the surface of the table the slate to be trimmed is similarly raised. The purpose for this will appear hereinafter.

The trimming mechanism will now be described. The knives by which the trimming of the slate is effected consist of two sets, a stationary and a reciprocating or shaving set. The stationary set of knives are shown in detail by Fig. 4 and consist of a steel blade G, securely fixed to the spindle G′ through the medium of the disk G^2. The knives G, are two in number and are secured to the elongated slots *g*, of the bridge *g′* through the medium of the spindles G′, which pass therethrough and which are held in place by the pinions H, fixed one to each spindle and above the bridge *g′*. This bridge, *g′*, is formed of cast iron and extends transversely across the table, it being secured thereto by means of the bolts H′ passing through the longitudinal elongated slots *h*, in the table. Rigidly secured to the middle of the bridge are two bolts *h′* which are received at their upper ends by the elongated slot I, of the toothed-wedge I′, and whereby the wedge I′ is locked at any desired position on the bridge. By this construction I am able to arrange the knives G, in any relative position, so as to cut or trim the slate in any preferred form, and to lock the knives in such position, by simply adjusting the wedge I′ so as to occupy all the space between the two pinions H, and then secure the wedge, which will secure the pinions also.

The cutting edges of the knives G, are a distance above the surface of the table equal to the height that the die blocks F′ project above the table, and by this latter arrangement the slate to be operated on is supported only at the points where the drills and knives operate upon it.

The movable or lower set of knives are indicated by the letter K, and these correspond in number and shape to their companions, G′, and are arranged so that their cutting edges—the upper edges—will pass just to the outside of the stationary knives, thereby effecting a cut similar in some respects to a "shear cut." These knives, K, are secured rigidly to the disk *k′*, which is in turn securely fastened to the bolt or shank *k*. Shanks *k*, are of course two in number one for each knife, and are arranged in the laterally elongated slots *k′* formed in the transverse bar L, which bar is in turn fastened to the operating lever L′.

By reference to Fig. 1 the lever L′ and the attending mechanism may be seen, and this lever is fulcrumed in the socket *l*, in the forward part of the machine and extends rearwardly to a point just beyond the punching mechanism and in the under side of the table. Secured rigidly to the cross beam M, of the frame M′ is a steam cylinder *m*, in which operates a piston and rod *m′*, the end of the rod being attached to the free end of the lever L′, by means of a bolt working in the laterally elongated slot m^2. Communicating with each end of the cylinder *m*, are the steam pipes N and N′ which come to a juncture at the four-way cock *n*, and from whence they communicate with the main pipe *n′*. The four-way cock *n*, is in connection with the atmosphere by means of the short pipe O, and is so arranged that by oscillating it, by means of the handle O′, the steam under pressure in the main pipe *n′*, will be allowed to pass alternately into each pipe and into each end of the cylinder thereby effecting in the piston and rod *m′* therein the reciprocating motion common to such engines. By means of the pipe O, and its connection with the cock *n*, the exhaust steam is fed thereto and from this point to the atmosphere. In practice I propose to connect the pipe *n′* to the source of steam from which the engine for driving the drive shaft derives its energy, or if the construction of the latter engine will admit it, to the exhaust of the engine. This latter method is far preferable as by it the operation of the cylinder *m*, costs nothing as the exhaust steam from the engine would be otherwise wasted.

In order that the two sets of knives can engage each other it will be necessary to form openings *o*, in the table which are necessarily only large enough to allow the knives *k*, to pass through them, but which are by preference made to include a large part of the table so as to do away with a great deal of unnecessary weight.

The slate operated upon is represented by the letter P, and is, in Fig. 3, shown partially broken away.

P′ represents the gages whereby the position of the slate is determined, and these gages are preferably two in number and ad-

justable on lines at right angles to each other so as to regulate and render changeable the position of the slate.

The manner of making my device having now been described, I will proceed to disclose the principle and method of using it.

When it is desired to trim and suitably perforate roofing slate, the drills and knives are first adjusted to the desired degree, by means heretofore described, and the slate inserted in the machine care being taken to have it flush with the slate gages. The drill driving shaft is then set in motion and after the drill has acquired the necessary velocity the treadle e' is depressed which will be followed by the downward movement of the drills and their subsequent engagement with the slate. The treadle e' is of course, held down during the drilling operation and when this has been completed it is released and the weighted levers E, allowed to return them to their normal positions. The operation of trimming is performed by so oscillating the cock n, that the steam from the pipe n' will be guided into one of the pipes N and N' and thence into the cylinder at the bottom of the piston. This will cause the piston to make an upward stroke and lift with it the lever m^2 which will be followed by an upward movement of the knives K, and a consequent trimming of the slate. After this has been accomplished the disposition of the cock n, is reversed thereby returning the piston to its normal position or that which is ready for a second operation.

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

1. In a slate perforating machine the combination of a revolving drive shaft, a spindle driven thereby and formed angular in cross-section, a sleeve fitting snugly over the spindle and capable of independent longitudinal movement thereon and incapable of independent rotary movement thereon, a drill attached to the sleeve, an annular groove on the sleeve, a reciprocating bar adjacent to the sleeve and having a rib in connection with the groove in the sleeve; treadle mechanism in connection with the reciprocating bar whereby it is reciprocated and the drill made to engage its work and means for automatically returning the bar and drill, substantially as described.

2. In a slate trimming and perforating machine the combination with a suitable table provided with gages and fixed knives, of a steam actuated lever carrying a bar provided with knives adapted to be reciprocated in conjunction with the fixed knives to trim the slate, a pair of drills provided with treadle mechanism and retracting weights, and a steam cylinder containing a piston connected to actuate said knife actuating lever, whereby the slate can be bored and trimmed simultaneously, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN H. JACKSON.
JAMES E. JACKSON.

Witnesses:
N. D. CHASE,
F. L. CONDICT.