

(No Model.)

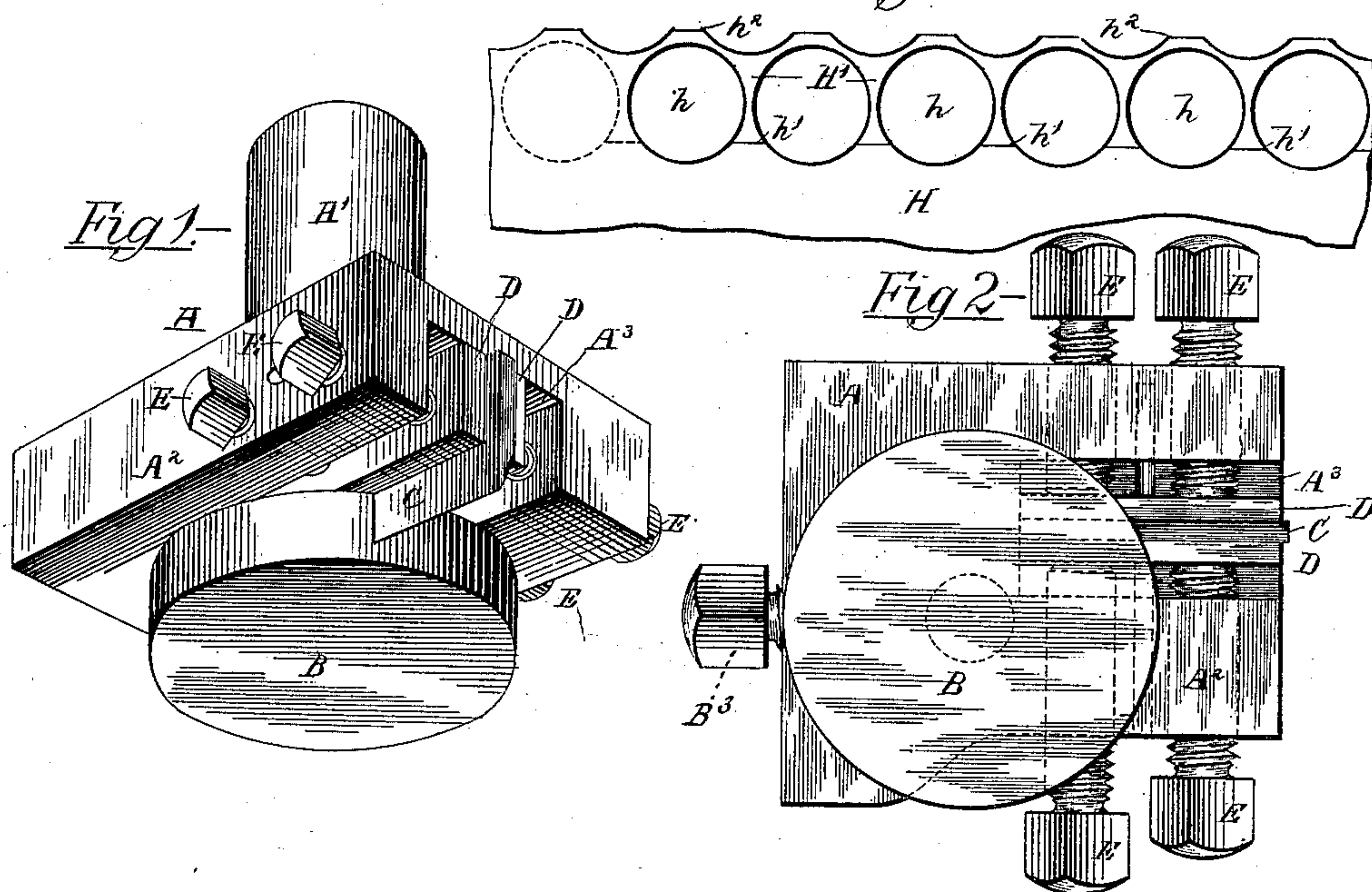
M. D. KNOWLTON.

PUNCH.

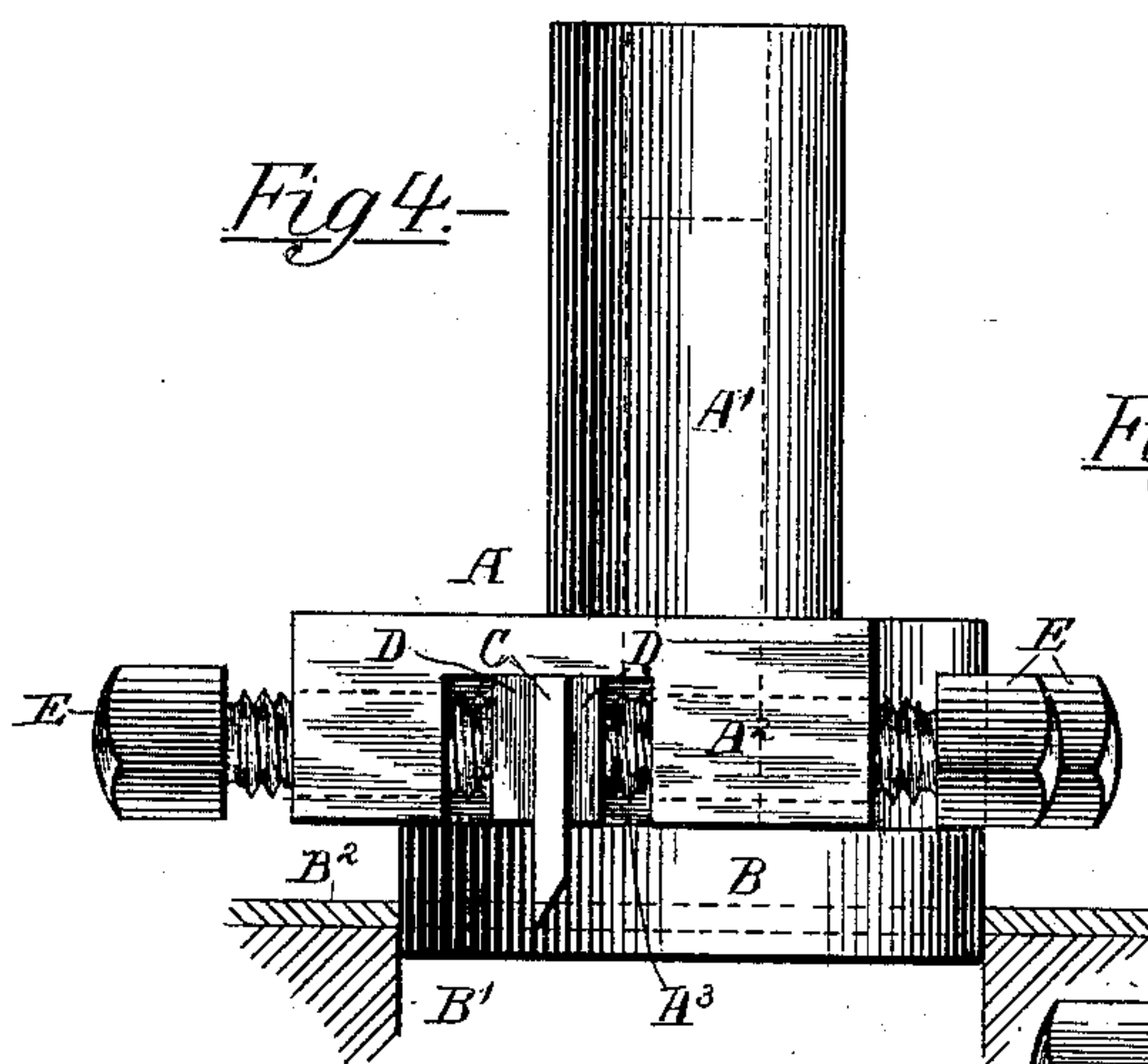
No. 384,532.

Patented June 12, 1888.

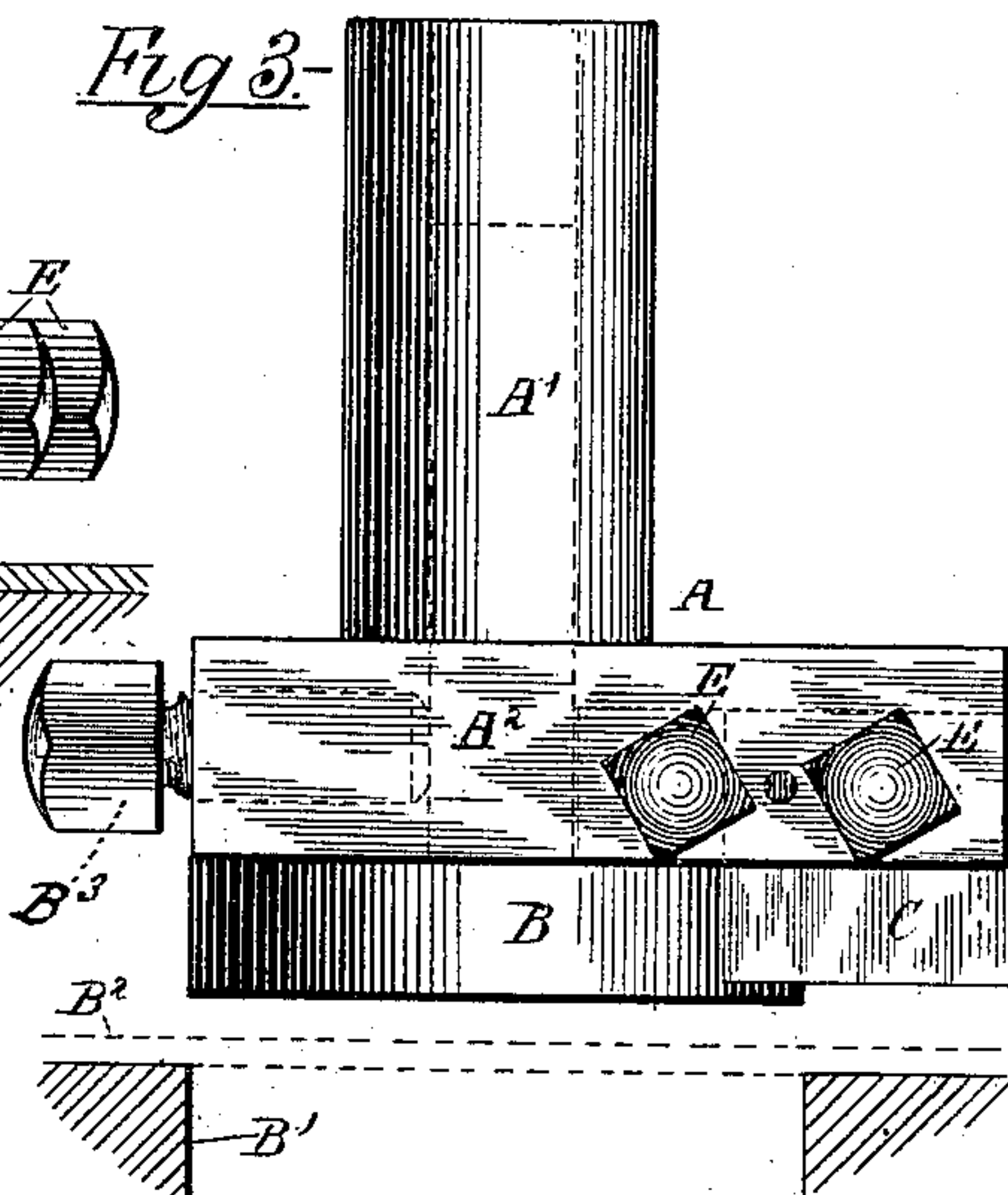
*Fig 6.*—



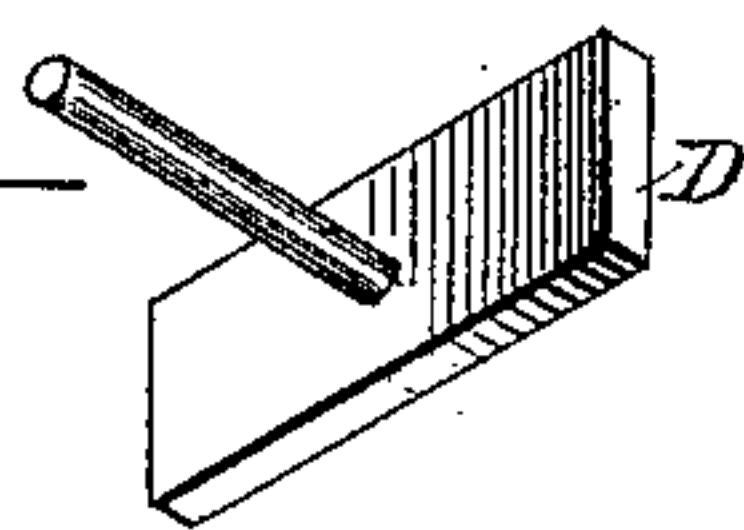
*Fig 4.*—



*Fig 3.*—



*Fig 5.*—



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# UNITED STATES PATENT OFFICE.

MARK D. KNOWLTON, OF CHICAGO, ILLINOIS.

## PUNCH.

SPECIFICATION forming part of Letters Patent No. 384,532, dated June 12, 1888.

Application filed August 19, 1887. Serial No. 247,340. (No model.)

*To all whom it may concern:*

Be it known that I, MARK D. KNOWLTON, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Punches; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a novel construction in punches of that kind used for cutting objects of various shapes from sheets or plates of paper, straw-board, metal, or other material.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

A punch embodying my invention embraces, in addition to the projecting part carrying the cutting-edge by which the object to be formed is severed about its margins from the plate or sheet, an auxiliary cutter extending outwardly from the main cutting-edge of the punch and acting to sever the material of the sheet or plate across the part between the line at which the sheet is cut by the punch and the aperture left by the removal of the piece previously cut out. The auxiliary cutter thus serves to trim the edge of the sheet as the cutting progresses, so as to leave the sheet with an even or uniform edge and in convenient form for handling.

In the accompanying drawings, Figure 1 is a perspective view of a punch embodying my invention. Fig. 2 is a face view of the same. Fig. 3 is a side elevation of the same, showing the flat face of the auxiliary cutter. Fig. 4 is a side elevation of the same, showing the auxiliary cutter in end view. Fig. 5 is a detail view of an adjustable clamp-plate employed for holding the auxiliary cutter in place. Fig. 6 is a view of a sheet from which a series of disks have been cut by the punch shown in Figs. 1, 2, 3, 4, and 5, illustrating the action of the auxiliary cutter.

In the drawings, Figs. 1 to 5, A indicates as a whole a frame or holder adapted for attachment to a press or other actuating device and constructed to receive and hold a punch of any size or shape.

B indicates a solid punch of cylindric shape, which is attached to the holder A by means of a cylindric shank on the punch entering an axial recess in the holder and secured therein by means of a set-screw, B<sup>3</sup>.

C is an auxiliary cutter, which is provided with an acute or chisel edge, and is arranged with one of its ends in contact with the side of the punch. Said cutter in the particular embodiment of my invention herein shown is held in operative position with relation to the punch by a clamping or holding device so arranged that the said auxiliary cutter may be moved or shifted in position both laterally and endwise, to correspond with the form or size of punch which is secured in the said holder.

The holder A herein illustrated is provided with a cylindric shank, A', having an enlarged flat part or plate, A<sup>2</sup>, against which the punch B directly rests or bears. Devices are provided in the particular holder shown for adjustably supporting the cutter C, as follows: The cutter in this instance consists of a flat plate beveled at one side to form an acute cutting-edge. In the lower surface of the plate A<sup>2</sup> of the holder is formed a recess, A<sup>3</sup>, within which are located two clamp-plates, D D, arranged to bear against opposite sides of the cutter C. The said plates are held in contact with the cutter by means of opposing set-screws E E, inserted through opposite sides of the plate A<sup>2</sup>, and extending into the recess A<sup>3</sup> in such manner as to sustain the clamp-plates in a desired position therein. As herein shown, four set-screws E E are used for holding the clamp-plates in place; but a greater or less number may be used in practice, as desired. The recess A<sup>3</sup> and clamp-plates D D extend inwardly to a point adjacent to the shank of the punch, thereby enabling the auxiliary cutter to be secured in place with its end in contact with a punch of the smallest size adapted to be placed in the holder.

By backing out or advancing the set-screws E E the clamp-plates and cutter may be shifted laterally to bring the cutting-edge in a desired position relatively to the cutting-edge of the punch, according to the width of the waste strip which it is desired to cut from the margin of the sheet.



The cutting-edge of the auxiliary cutter C is set back from the lower face of the punch such distance that when the punch is advanced into the opposing matrix the full extent of its throw the edge of the cutter will come in contact or nearly in contact with the upper face of the matrix, thereby acting with direct pressure to cut or sever the sheet in its part adjacent to the punch. Even if the cutter does not come in actual contact with the matrix the sheet will usually be cut sufficiently to be easily separated, and the general result desired thus attained. In the case of material like thick straw-board, for instance, the oblique edge of the cutter will force or break away the stock along the cut, so as to completely sever the same when the cutter passes only part way through the sheet.

B', Figs. 3 and 4, indicates the matrix, and B<sup>2</sup> a sheet laid over the same beneath the punch. In Fig. 3 the punch is shown as free from the matrix; but in Fig. 4 it is shown as advanced into the matrix a sufficient distance to carry the edge of the cutter C through the sheet resting upon said matrix.

In the use of a punch provided with an auxiliary cutter arranged as above described the sheet is fed to the punch with its edge approximately parallel with the cutter, and is advanced to the cutter in such direction that the auxiliary cutter extends forwardly from the punch, (referring to the direction of motion of the sheet,) and is located at the side of the cutter nearest the body or uncut portion of the sheet, so that the parts of the sheet left between the cuts are continually severed from the main part of the sheet as the cutting progresses.

The operation of the auxiliary cutter in the manner set forth may be more readily understood by reference to Fig. 6, which shows the marginal part of a sheet from which a number of disks have been cut by a punch like that shown in Figs. 1 to 5. H, in said Fig. 6, is the sheet, *h h* are a series of holes left by the removal of the disks, and the lines *h' h'* indicate the cuts made by the auxiliary cutter. In cutting circular disks the surplus material along one line of holes will not be entirely severed until the cuts have been made throughout the full length of the sheet, and in said Fig. 6 *h<sup>2</sup> h<sup>2</sup>* indicate the lines of the cuts made by the auxiliary cutter in punching out a previous line of holes, while *H'* indicates as a whole the strip of surplus material which will be severed from the sheet after the holes *h h* have been formed throughout the full width of the sheet.

The employment of an auxiliary cutter acting to trim the edge of the sheet as fast as objects are cut therefrom by a punch is of especial utility in the case of a punching-machine embracing a guide or gage for determining the position of the edge of the sheet with relation to the punch, and also in machines having automatic feed devices for the sheets, for the reason that the severing of the projecting surplus

parts of the sheets leaves a straight edge or a series of projecting parts after each row of cuts, whereby the sheet may be placed or held against the guide in a hand-feeding machine or the guides of the feed devices in an automatic machine, and the position of the sheet thereby accurately determined.

The employment of the auxiliary cutter, severing the waste as the holes are formed, furthermore enables a gage acting against the newly-cut edge to be used in addition to the back gage, or that at the rear of the punch, heretofore employed. The use of such second gage greatly facilitates the handling of the stock by affording a guide to the advance end of the sheet at the time the latter is so far advanced as to have but little bearing upon the back gage. Heretofore in the use of a punching-machine having a back gage to guide the stock, as well as in automatically-feeding machines, it has been common to cut the stock into narrow strips somewhat wider than the articles to be formed, in order to afford suitable guiding-edges by which each row of holes may be made. In the use of a punch made with an auxiliary cutter such as is herein shown, however, such cutting into strips is not required, whereby the holes may be made closer to each other, with a large saving of waste and a corresponding economy in the use of the stock, and the labor of cutting the stock into strips is avoided.

It will of course be understood that the auxiliary cutter, arranged and operating in the manner described, may be employed in connection with punches of any shape, and when said punches have a cutting-edge of either regular or irregular form.

The main feature of novelty in my invention embraces a punch and matrix or similar cutting device provided with an auxiliary cutter arranged to act against an opposing surface of the matrix to sever the blank sheet or plate in the part of the latter adjacent to the cutter in such manner as to cut or slit the said sheet or plate outwardly from the opening made therein by the punch—as, for instance, the appended first claim covers the auxiliary cutter when made either integral with or separate from the punch proper, or when either immovably or adjustably connected with the punch or its support. Such auxiliary cutter, furthermore, may obviously be arranged at any desired angle with relation to the punch.

The particular construction shown in Figs. 1 to 5, embracing means for adjustably supporting the cutter, forms a separate improvement, which is herein specifically claimed as part of my invention.

I claim as my invention—

1. The combination, with a punch and a die or matrix, of an auxiliary cutter extending outwardly from the punch, said auxiliary cutter having its cutting-edge set back from the cutting-edge of the punch and arranged to act against an opposing flat surface of the die or matrix, substantially as described.



2. The combination, with a punch and a die  
or matrix, of an auxiliary cutter attached to  
and extending outwardly from the punch, the  
cutting-edge of said auxiliary cutter being set  
5 back from the cutting-edge of the punch and  
arranged to act against an opposing flat sur-  
face of the matrix, and means adjustably con-  
necting said cutter with the punch, whereby  
the edge of the cutter may be adjusted with  
10 relation to the opposing face of the matrix,  
substantially as described.

3. The combination, with a punch and a die  
or matrix, of an auxiliary cutter extending  
outwardly from the cutting-edge of the punch  
15 and arranged to act against an opposing flat  
surface of the matrix, and a holder for the  
said punch and auxiliary cutter, said cutter  
being adjustably sustained in the holder by  
means affording both an endwise and lateral

adjustment of the cutter, substantially as de- 20  
scribed.

4. The combination, with a punch, of a hold-  
er for the same provided with a shank for at-  
tachment to a punching-machine, and with a  
plate supporting the punch and provided with 25  
a recess in its lower face, an auxiliary cutter,  
movable clamp-plates located within the said  
recess, and opposing set - screws inserted  
through said plate and bearing against the  
clamp-plates, substantially as described. 30

In testimony that I claim the foregoing as  
my invention I affix my signature in presence  
of two witnesses.

MARK D. KNOWLTON.

Witnesses:

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