

E. B. STIMPSON, Jr.

PERFORATING MACHINE.

No. 370,985.

Patented Oct. 4, 1887.

Fig. 1.

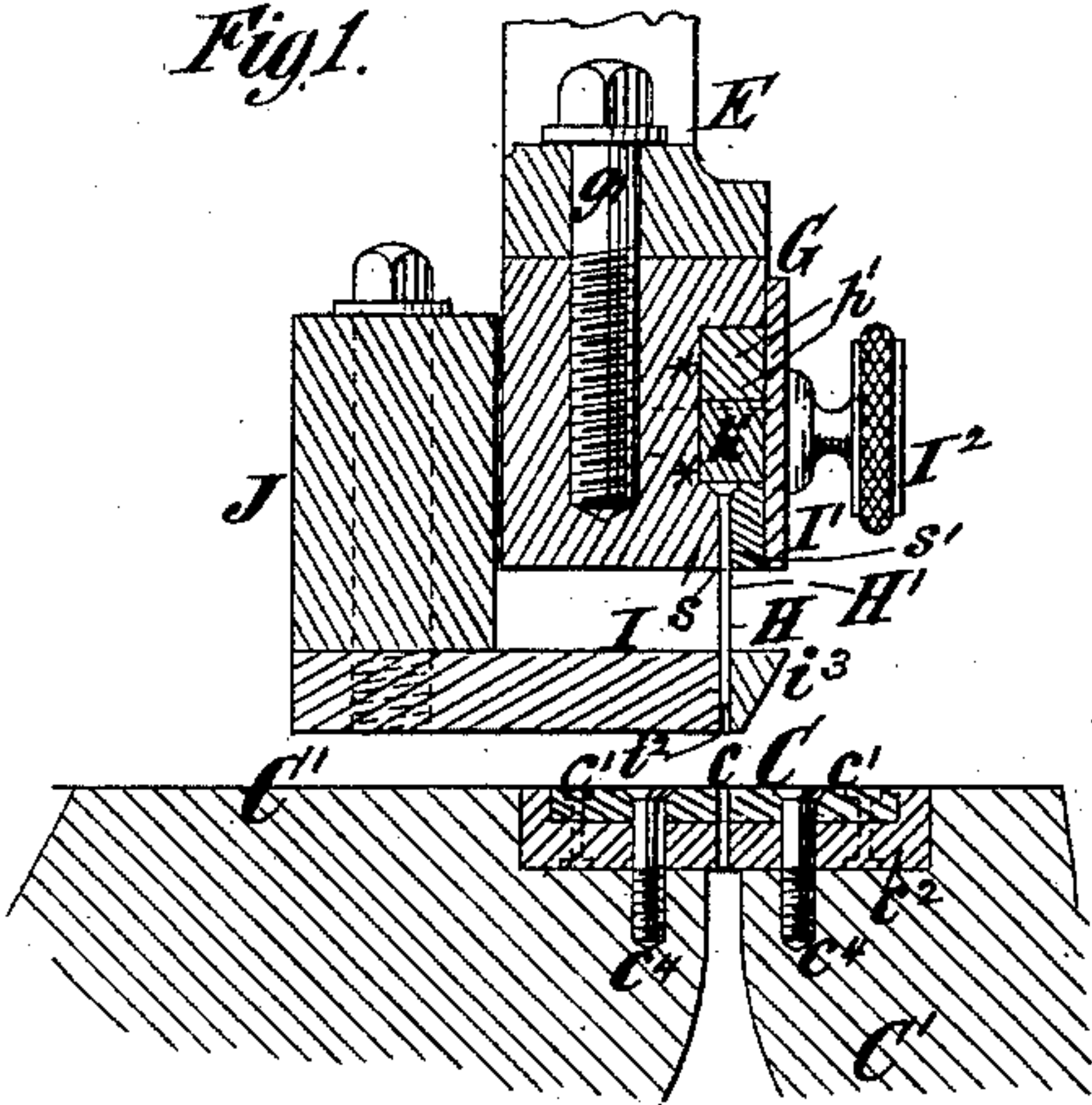


Fig. 3.

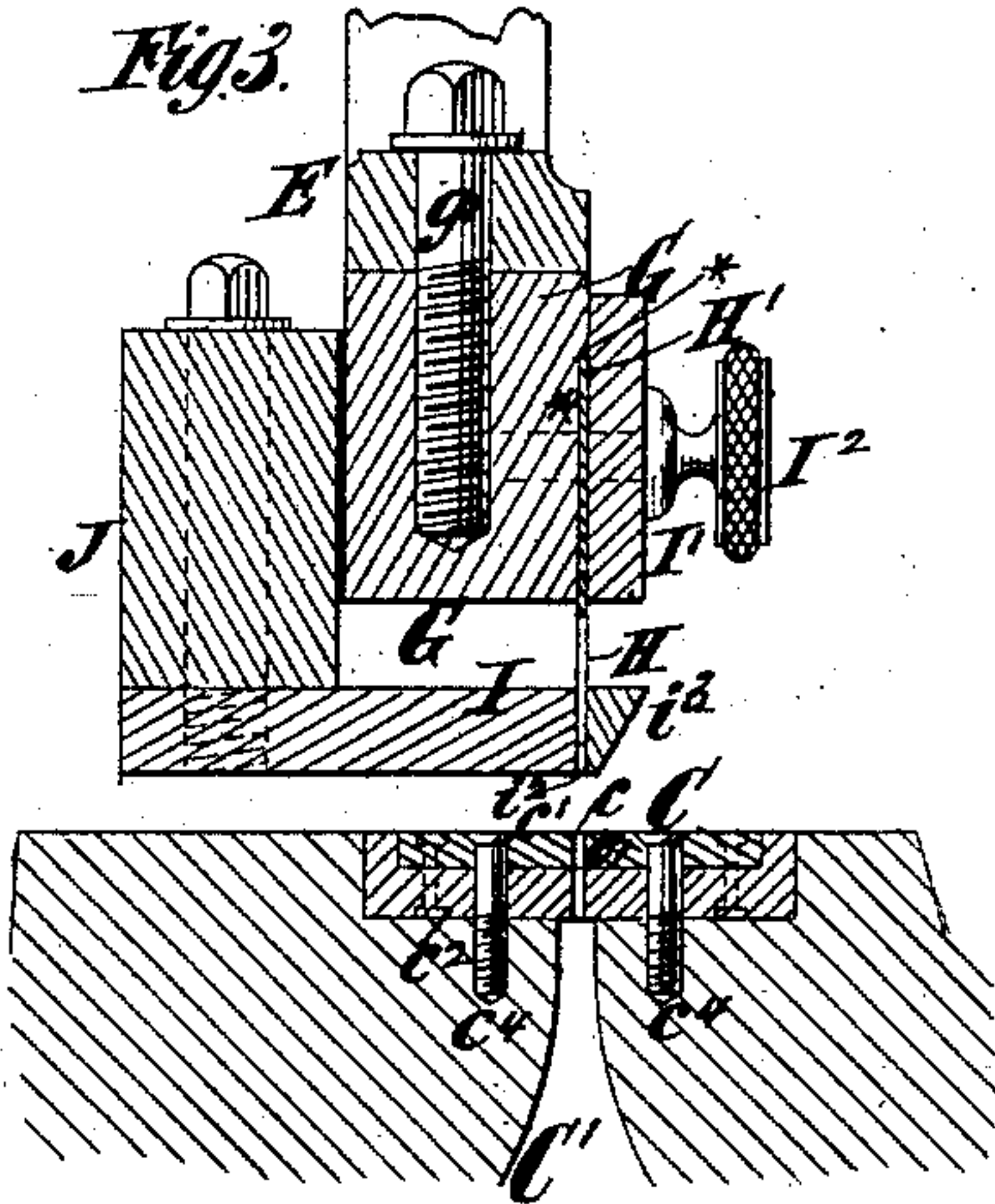


Fig. 2.

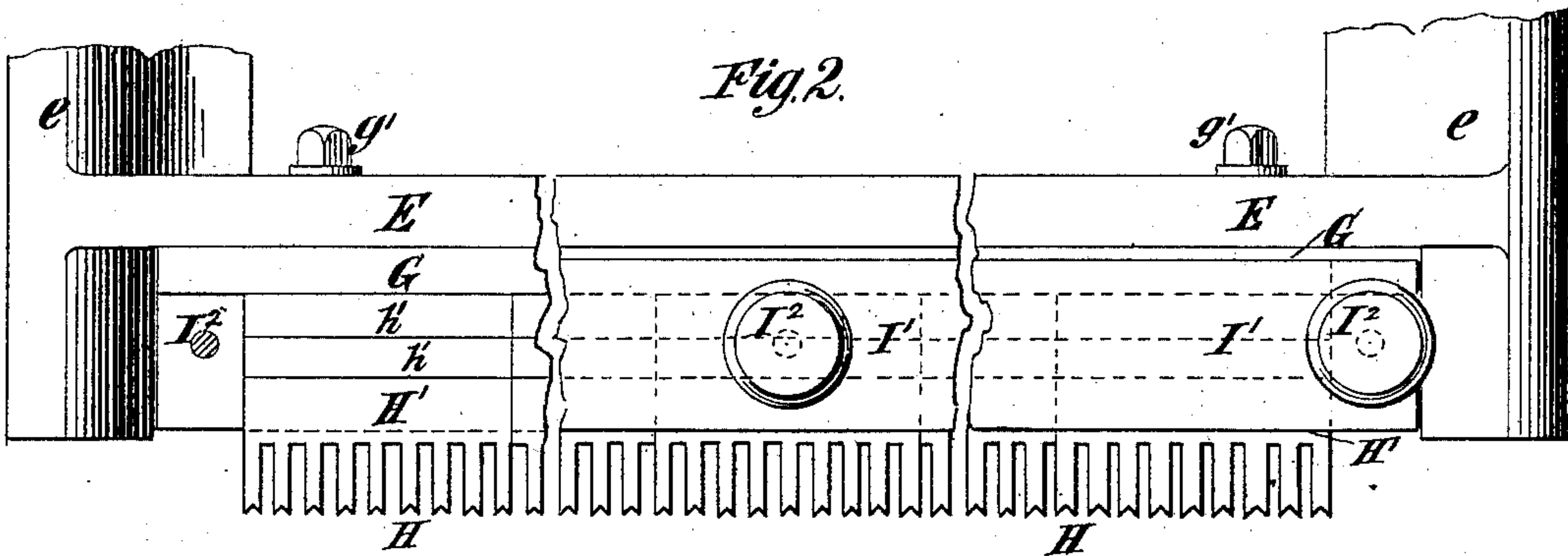


Fig. 4.

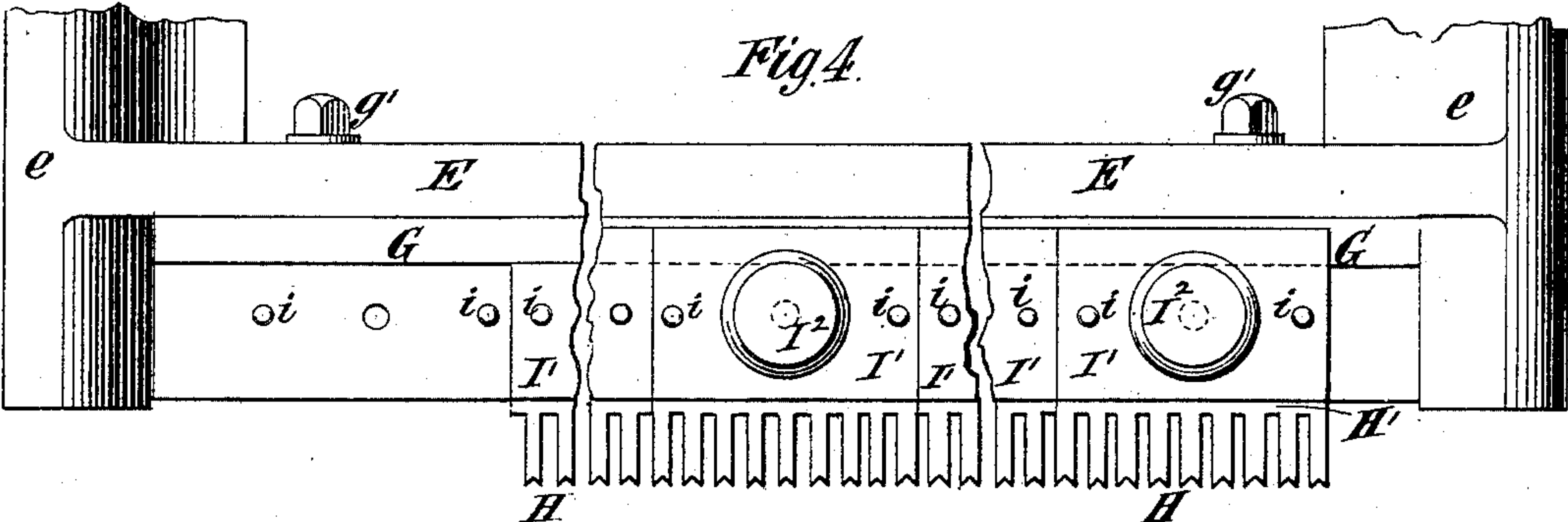
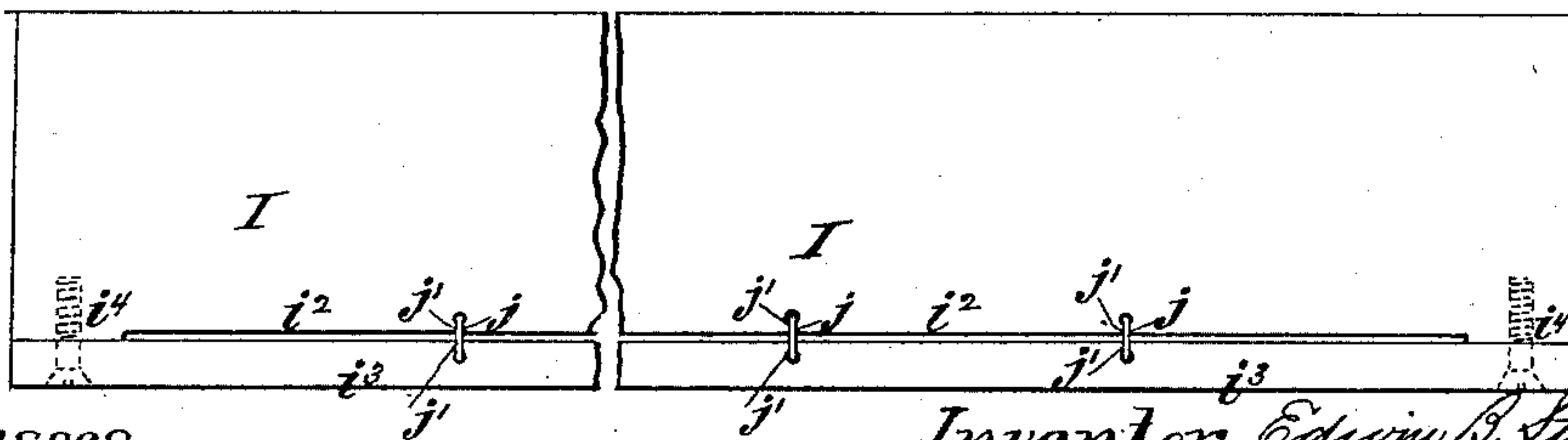


Fig. 5.



Witnesses.
Miner & Lindemann
Esq. Boston

Inventor Edwin B. Stimpson Jr.
by his atty
Brown & Hall

(No Model.)

2 Sheets—Sheet 2.

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Fig. 6.

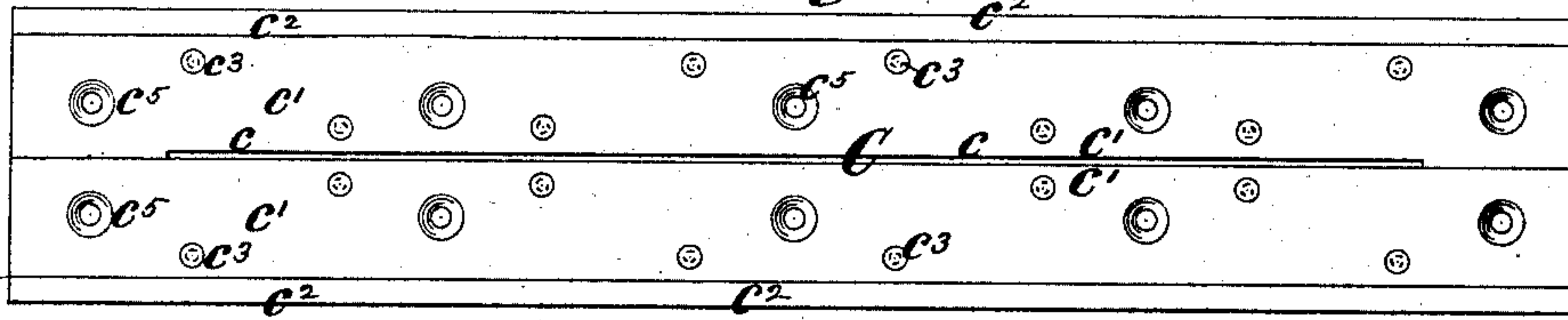


Fig. 7.

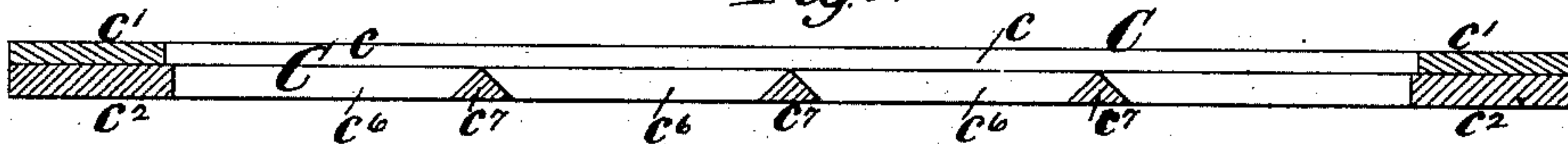


Fig. 8.

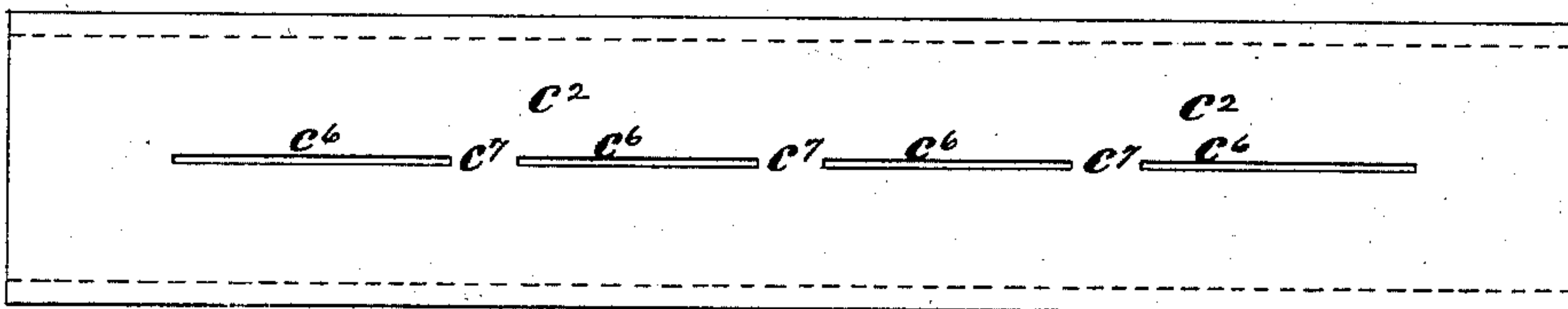


Fig. 9.

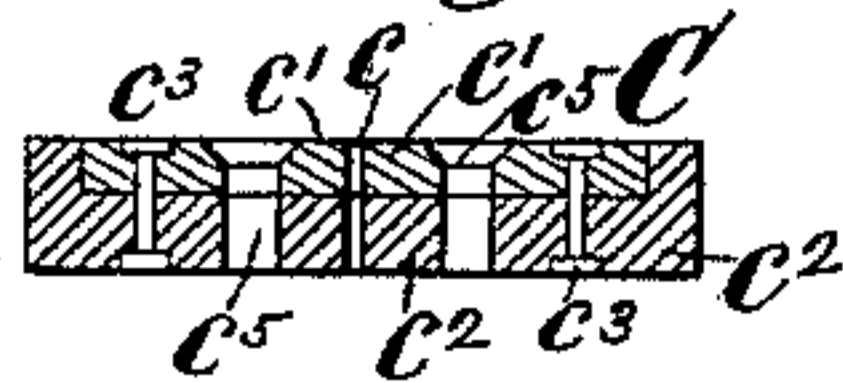


Fig. 10.



Fig. 11.

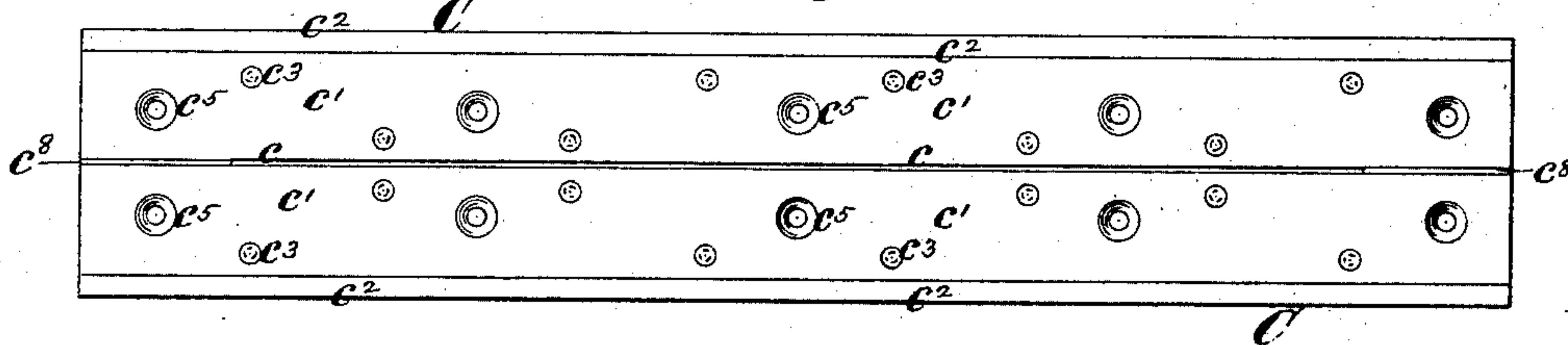
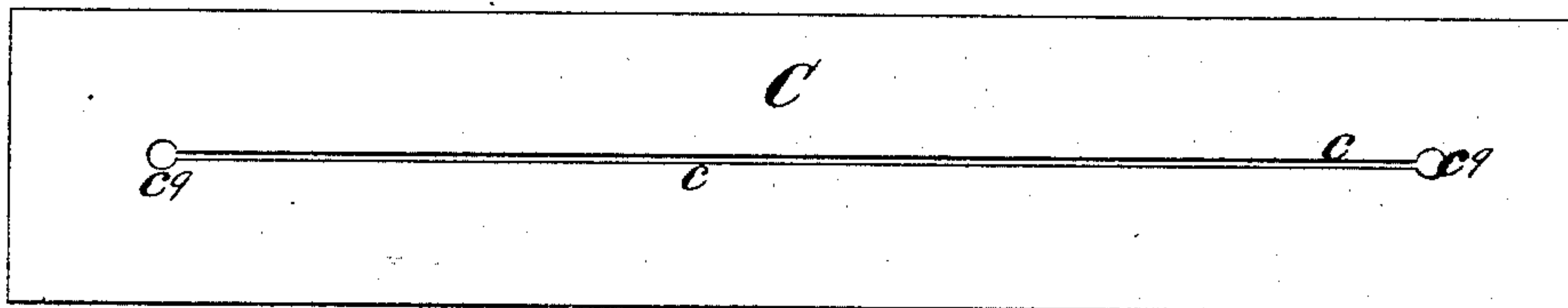


Fig. 12.



Witnesses.

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UNITED STATES PATENT OFFICE.

EDWIN B. STIMPSON, JR., OF BROOKLYN, NEW YORK.

PERFORATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 370,985, dated October 4, 1887.

Application filed March 19, 1886. Serial No. 195,787. (No model.)

To all whom it may concern:

Be it known that I, EDWIN B. STIMPSON, Jr., of Brooklyn, in the county of Kings and State of New York, have invented a new and
5 useful Improvement in Machines for Punching Paper, &c., of which the following is a specification.

My invention relates to machines for perforating paper, leather, thin sheet metal, or
10 other materials by removing portions thereof to form lines or rows of fine perforations, and which comprise a reciprocating punch-holder carrying a line or row of punches separated by spaces and a die, in conjunction with which
15 the punches act.

My invention is more directly applicable to machines which are intended for forming very narrow and oblong or rectangular perforations, such as are very desirable in check-
20 books and other papers. For performing this class of work a rotary perforating-wheel provided with projecting teeth serving as punches has been employed both in connection with an oppositely-arranged wheel or roller having
25 a narrow circumferential groove receiving the teeth or punches and in connection with a straight slot formed between two parallel strips. In the former case, wherein is employed a bed roller or wheel having a narrow
30 groove, both this roller or wheel and the rotary perforator carrying the punches have been geared together and operated either by hand or power. In machines where the rotary perforator or wheel is operated in connection
35 with straight and flat bed-pieces, forming between them a slot, the perforator or wheel is rolled by hand over the paper, which is stationary upon such bed. In machines having a rotary perforator or punch-wheel the punches
40 of course have a circular motion, while the paper is straight and flat, and there is in such machines a tendency for the punches after cutting and in passing out of the paper to tear away the partitions or bridges of paper be-
45 tween the slots, and in machines having a rotary perforator or punch-wheel the perforations are not formed simultaneously throughout the length of the line to be perforated, but are formed successively one after another.

50 In machines to which to my invention relates, and in which a line or row of punches

is carried by a reciprocating punch-head, and is by the movements of the punch-head caused to operate to form an entire row or line of perforations at one operation, the die has
55 invariably had separate and complete perforations or die-openings for each one of the punches, and such separate perforations or die-openings for the several punches have heretofore been considered indispensable in
60 these machines. Although it was known that a rotary perforator or punch-wheel operating to form perforations in succession along a line from one end thereof to the other could be employed in connection with a continuous
65 groove or slot over which the paper is supported, it has not heretofore been considered possible to employ such continuous slot in connection with a line or row of punches operating simultaneously, because it was sup-
70 posed that the paper would be torn or cut away throughout the entire line or row and that the punches operating simultaneously would not leave intact the bridges or partitions of paper between the perforations.

75 By experiment I have discovered that where the perforations are to be made very narrow, say, about one sixty-fourth of an inch wide, the work can be done much more perfectly by a straight line or row of punches carried by a
80 reciprocating punch-head and operating in connection with a long die-slot receiving the entire number of punches than can be done by a rotary perforator operating to punch holes successively from one end of a line or row to
85 the other.

My invention therefore consists in the combination, with a reciprocating punch head or holder carrying a straight row or series of punches separated by spaces and which by the
90 movement of the punch-holder are caused to operate simultaneously, of a die having a slot or long opening in which the punches operate, and a bed supporting the die and having an opening below the die-slot for the passage of
95 scrap removed by the punches. I also prefer to employ in connection with the reciprocating punch-head, its punches, and the die, constructed as above described, a stripper also having a long slot or opening through which
100 the punches work, as distinguished from a stripper of the kind ordinarily employed in

machines of this character and which has separate openings or perforations for the several punches.

The invention also consists in other novel combinations of parts, hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical section of portions of a machine embodying my invention, and Fig. 2 is a front view thereof. Fig. 3 is a sectional view similar to Fig. 1, illustrating a slight modification of my invention. Fig. 4 is a front view similar to Fig. 2, also showing the modified construction of Fig. 3. Fig. 5 is a plan of the stripper alone. Figs. 6, 7, and 8 are respectively a plan and longitudinal section and an inverted plan or bottom view of a die embodying my invention. Figs. 9 and 10 are transverse sections of dies differing slightly in construction, and Figs. 11 and 12 are plans of two dies of a construction slightly different from those before referred to.

Similar letters of reference designate corresponding parts in all the figures.

The punches and dies here shown are intended to be employed in a machine which comprises a stationary bed to which the die is secured and a vertically-reciprocating cross-head having attached to it the punch-holder which carries the line or row of punches. A machine of any suitable construction and comprising these elements may be employed; but for the purpose of illustration I have shown herein parts of a machine which form the subject-matter of Letters Patent No. 313,383, granted March 3, 1885, to Edwin B. Stimpson, and I have employed the same letters of reference as are used in the said patent to indicate corresponding parts.

E designates a portion of the cross-head having at the ends eyes or sockets *e*, which are intended to slide upon vertical rods or guides. (Not here shown.)

G designates the punch-holder, which is secured to the cross head E by bolts *g*'.

H designates the punches. I designates the stripper or stripper-plate, which is attached to the stripper-beam J; and C designates the die supported on the bed or frame C' of the machine, and which has an opening opposite the die-opening to permit the escape of scrap removed by the punches. The punches H which are here shown are not separate one from another; but they are formed by notching the edge of the flat plate H', as best shown in Figs. 2 and 4, in order to form the punches with parallel edges and their intervening spaces with parallel walls. The punches may be very cheaply formed in this way and will always be in perfect alignment, and this construction also enables the punches to be readily manipulated and conveniently placed in the machine. The plates H' (shown in Figs. 1 and 2) are slightly headed or upset at the upper edge and fit in a narrow slot, *s*, formed between a front strip, *s*', and the part of the punch-holder G to which it is secured.

The punch-holder G is channeled at the front, as shown at *, so as to receive parallel packing-pieces *h*', inserted in this channel above the plate H', on which the punches are formed. The pieces *h*' are covered by a cap-plate, I', secured by screws I² to the front of the punch-holder. In this class of perforating-machines it is often desirable to render a certain number of the punches at a desired point of the line or series inoperative, so that they, instead of puncturing the paper or other material, will stop on striking the material and fail to puncture it, while allowing the remaining punches and the punch-holder to be forced downward in order to perforate the paper. The line or row of punches is formed upon a number of plates, H', which are arranged end to end and may be of any desired lengths, and the packing-strips *h*' are of corresponding lengths.

When it is desired to render the punches of any one of the plates H' inoperative, all that is necessary is to remove the cap-plate I' and take out one or both of the packing-pieces *h*' pertaining to that plate. The cap-plate I' may then be replaced and the plate H', from which the packing-pieces were removed, will be free to rise when its punches strike the material; and its punches will not operate.

In Figs. 3 and 4 the punch-holder G has a very shallow channel or rabbet, *, in its face, and the plates H', on which the punches are formed, are of uniform thickness throughout. In this case, also, a number of plates H', which may be of different lengths, will be arranged end to end, and the cap-plate I' in this example of the invention is composed of sections which correspond in length to the plates H'. Whenever it is desired to render the punches of any one of the plates H' inoperative, the section of the cap-plate I' pertaining to that plate H' is removed, and then the plate H' is likewise removed, leaving all the remaining plates H' secured fast to the punch-holder by their sections of the cap-plate I' and its screws I². In Fig. 2 I have shown a portion of the cap-plate I' broken away, and in Fig. 4 I have represented one of the sections of the cap-plate I' and a corresponding plate H' removed.

The sections of the cap-plate I' shown in Figs. 3 and 4 may each be secured by pins *i* and a single screw I²; but these pins and screws also pass through the plates H', on which are formed the punches.

The stripper I, of which a plan is shown in Fig. 5, has in it a long narrow slot, *i*², through which the punches H work. This stripper, as here represented, consists of a plate having a bar or piece, *i*³, secured to its front edge by screws *i*⁴, and the slot *i*² is formed in the meeting edges of these two pieces. In order to prevent the two pieces of which the stripper is composed from spreading, and thus widening the slot *i*², I have represented said pieces as connected at intervals in the length of this slot by tie-pieces or keys *j*, which have enlarged heads or ends, and which are fitted to notches

j' , formed in the adjacent edges of the two pieces of the stripper. In applying these tie-pieces small holes of the same size as the enlarged ends thereof are drilled in the pieces of the stripper and notches are cut in the edges to these holes, and after the tie-piece is inserted its ends are riveted over. These tie-pieces or keys are so narrow that they will enter the spaces between the punches H, and they prevent the spreading of the slot i' . The strip s' may be connected with the punch-holder G by keys like the keys j shown in Fig. 5.

The die C has formed in it a slot or long opening, c , which is of very little width, being only sufficient to snugly receive the punches H, and through which all the punches of the row or line work. Of course in the use of a punch and die of this character the paper is not supported around the entire outline of the perforations, but only at opposite sides thereof, and with large perforations the paper would be torn. When the perforations are oblong or rectangular and very narrow—say about one sixty-fourth of an inch wide by one-sixteenth or one-eighth of an inch long—the support afforded the paper at the opposite long sides of the perforation is sufficient to enable the punches to operate effectively as long as the opposite flat sides of the punches snugly fit the parallel sides of the die-slot.

The die C represented in Figs. 6, 7, and 9 is the same as that shown in Figs. 1 and 3, and the die shown in Fig. 10 differs but very little therefrom. The die proper is composed of an upper portion, which, as here represented, is made in two pieces, c' , secured to a base portion or bar, c'' . This base portion or bar may be channeled, as shown in Figs. 6, 7, 8, and 9, or it may have a flat upper surface and be of equal width with the two sections c' which compose the upper portion of the die, as shown in Fig. 10. In both cases the slot c is formed in the meeting edges of the portions c' , and, as shown in Fig. 6, is formed in the edge of one section, the other section having a plain straight edge.

The two sections c' which form the upper surfaces of the die are firmly secured by rivets c^3 or otherwise to the base portion or bar c'' , and the die is secured to the bed or base C' of the machine by screws c^4 , inserted through holes c^5 in the die. In order to strengthen the base portion or bar c'' in its slot, which is coincident with the slot c , I have represented it as having shorter slots, c^6 , as shown in Figs. 7 and 8, which are inclined or beveled at the ends, so as to form triangular bridges c^7 in the slot for tying the portions of metal at opposite sides of the slot together. The triangular shape and sharp apex of these bridges prevent the scrap or punchings of paper or other material from lodging and sheds them off. These bridges have considerable length between the slots c^6 , as shown in Fig. 8, on the under side of the die; but they present a sharp apex at the upper side of the die.

Instead of forming the slot or long opening

c of the die by recessing the edge of one of the sections c' , as shown in Fig. 6, the two sections c' may be left with plain and straight edges, as shown in Fig. 11, and short packing-pieces c^8 may be introduced between them at the ends, so as to properly fix the width of the slot formed between them. In Fig. 12 I have represented a die made in a single piece having in it a long narrow slot, c , at the ends of which are enlargements c^9 . Such enlargements, which are first formed by holes drilled through the die, enable a planing-tool to readily start and terminate its cut in making the slot c .

As I before stated, if the perforations to be formed by the machine were of any considerable size or width, it would be better to form separate die-openings for each of the punches, so as to support the paper around the entire outline of the perforation; but where the perforations are exceedingly narrow the line or row of punches may be operated in one long slot, as here shown, and if the punches are properly fitted in width to the die-slot they will make clean-cut perforations by removing portions of the paper or other material punched. The cost of such a die is very materially less than a die having a separate opening for each punch, and there can be no difficulty in cutting the slot in exact alignment with the punches in a direction lengthwise of the die, as there sometimes is when each of the punches enters a separate die-opening.

I am aware that it is not new to employ for perforating paper a machine having oppositely-arranged rollers or wheels, one provided with projecting punches and the other provided with a narrow circumferential groove in which the punches work; and I am also aware that it is not new to employ in connection with two bed-pieces or parallel strips forming between them a narrow slot and on which the paper is laid a rotary perforator or wheel provided with radial punches, and which is by hand rolled along the paper so as to cause its punches to perforate the paper along the line of the straight slot in the bed. In both these machines the perforations in any line or row are not formed simultaneously, but are formed successively one after the other and from one end of the line or row to the other end thereof. In the operation of such a machine the paper, as each perforation is formed, is entirely imperforate, and therefore is strong upon one side or end of the perforation, and hence there is no possibility of the paper tearing except at one end of the perforation or upon the end which is next the adjacent perforation.

It has heretofore been considered impossible to employ a long and continuous die-slot in connection with a line or row of punches which are carried by a reciprocating punch-head, and which operate simultaneously to produce the entire line or row of perforations. In perforating, the holes or perforations are formed very near together, and it has been

considered that if a line or row of punches upon a reciprocating punch-head were employed in connection with a long die-slot receiving all the punches the paper would not stand between the punches so as to form the perfect partitions or bridges desirable, but would be torn, thereby producing a long and ragged slit in the paper. Such a defect would of course render the machine useless.

It is well understood that the reciprocating punch-head carrying a line or row of punches and employed in connection with a die having separate die openings or perforations will produce far better work than can be performed by a rotary perforator, and I have experimented extensively to ascertain whether it were not possible to employ a reciprocating punch-head carrying a line or row of punches in connection with a single long die-slot. By these experiments I have found that such a construction is wholly impracticable if the holes or perforations are to be of any considerable width; and I have also found by experiment with punches varying in thickness from one one-hundredth or two one-hundredths of an inch to one-eighth or one-quarter of an inch in thickness that where the perforations to be formed are very narrow—say, for example, one sixty-fourth of an inch or thereabout—the work can be perfectly performed by the employment of a reciprocating punch-head carrying a line or row of punches operating in connection with the die having a long and very narrow slot receiving all the punches.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a reciprocating punch head or holder carrying a straight row or series of punches separated by spaces, and which, by the movement of the head or holder, are caused to operate simultaneously, of a die having a slot or long opening in which the punches operate and a bed supporting the die and having an opening below the die-slot for the passage of scrap removed by the punches, substantially as herein described.

2. The combination, with a series of punches

separated by spaces, of a die consisting of an upper portion having a slot or long opening for the punches, and a slotted base portion or bar, c^2 , having shorter slots, c^6 , the ends of which are inclined or beveled, so as to form the triangular bridges c^7 , substantially as herein described.

3. The combination, with a reciprocating punch-holder carrying a straight series or row of punches separated by spaces, and which, by the movements of the punch-holder, are caused to operate simultaneously, of a die having a long slot or opening in which the punches operate and to the parallel sides of which the opposite sides or faces of the punches are accurately fitted, a stripper consisting of parallel pieces having formed in their meeting edges a slot or long opening for the punches, and having the dovetailed or undercut notches j' at intervals in its length, and the tie-pieces or keys j , made separate from the pieces composing the stripper and having enlarged heads inserted in the notches and connecting the two pieces of the stripper, said tie-pieces being arranged in the spaces between the punches, substantially as herein described.

4. The combination, with a punch-holder and punches, which are formed by flat plates arranged end to end, and having their edges notched to form the punches with parallel edges and intervening spaces with parallel walls, of a cap-plate made entirely separate from the plates forming the punches and composed of sections corresponding in length to the flat plates forming the punches, whereby provision is afforded for removing any one or more of the flat plates on which are the punches and the corresponding section or sections of the cap-plate without disturbing the remaining plates on which are the punches and the remaining sections of the cap-plate, substantially as herein described.

EDWIN B. STIMPSON, JR.

Witnesses:

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EMIL HERTER.