

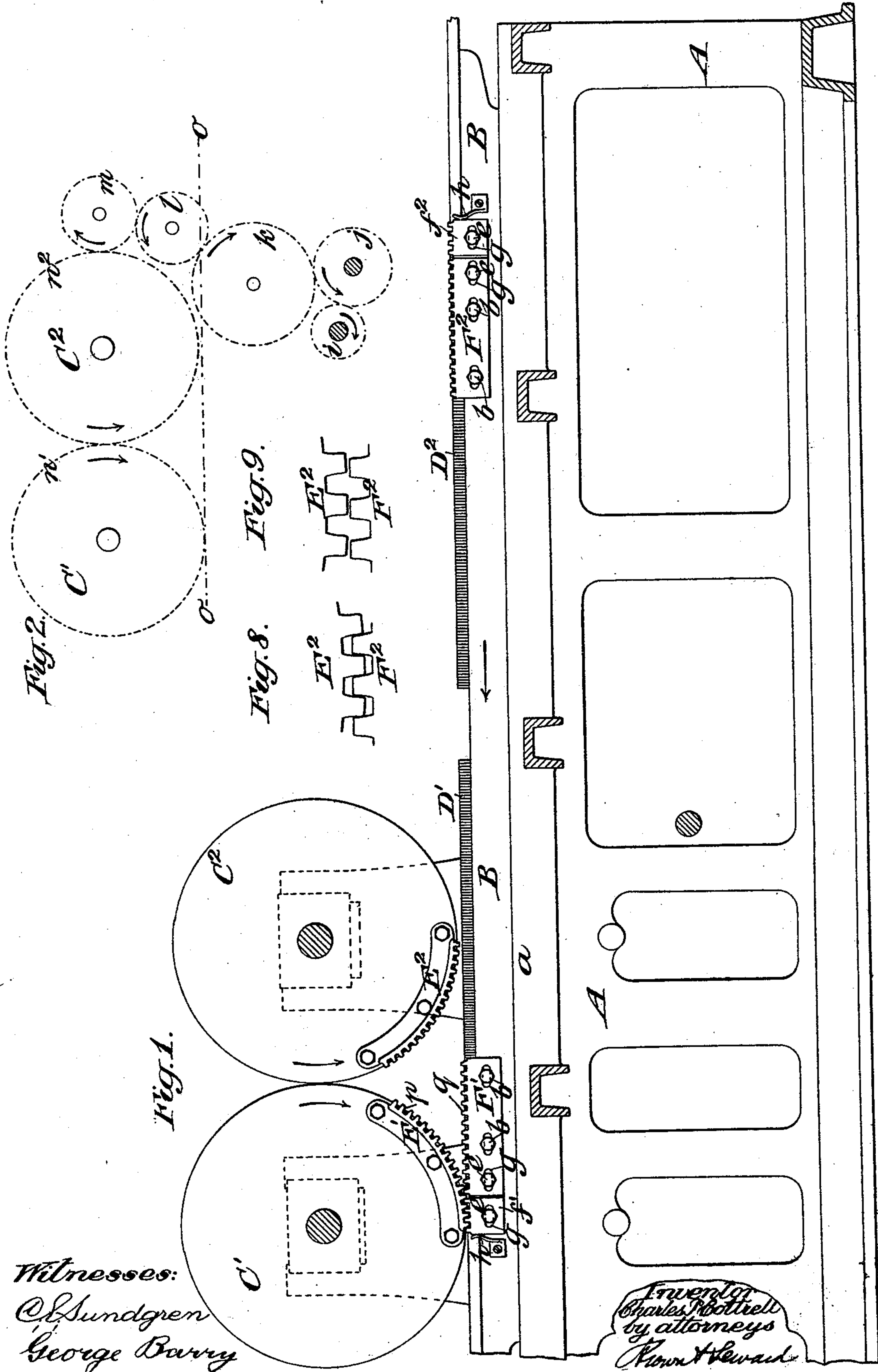
(No Model.)

2 Sheets—Sheet 1.

C. P. COTTRELL.  
PRINTING MACHINE.

No. 517,682.

Patented Apr. 3, 1894.



Witnesses:  
O. Sundgren  
George Barry

Inventor  
Charles Cottrell  
by attorneys  
Kinn & Hewitt

(No Model.)

2 Sheets—Sheet 2.

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Fig. 6.

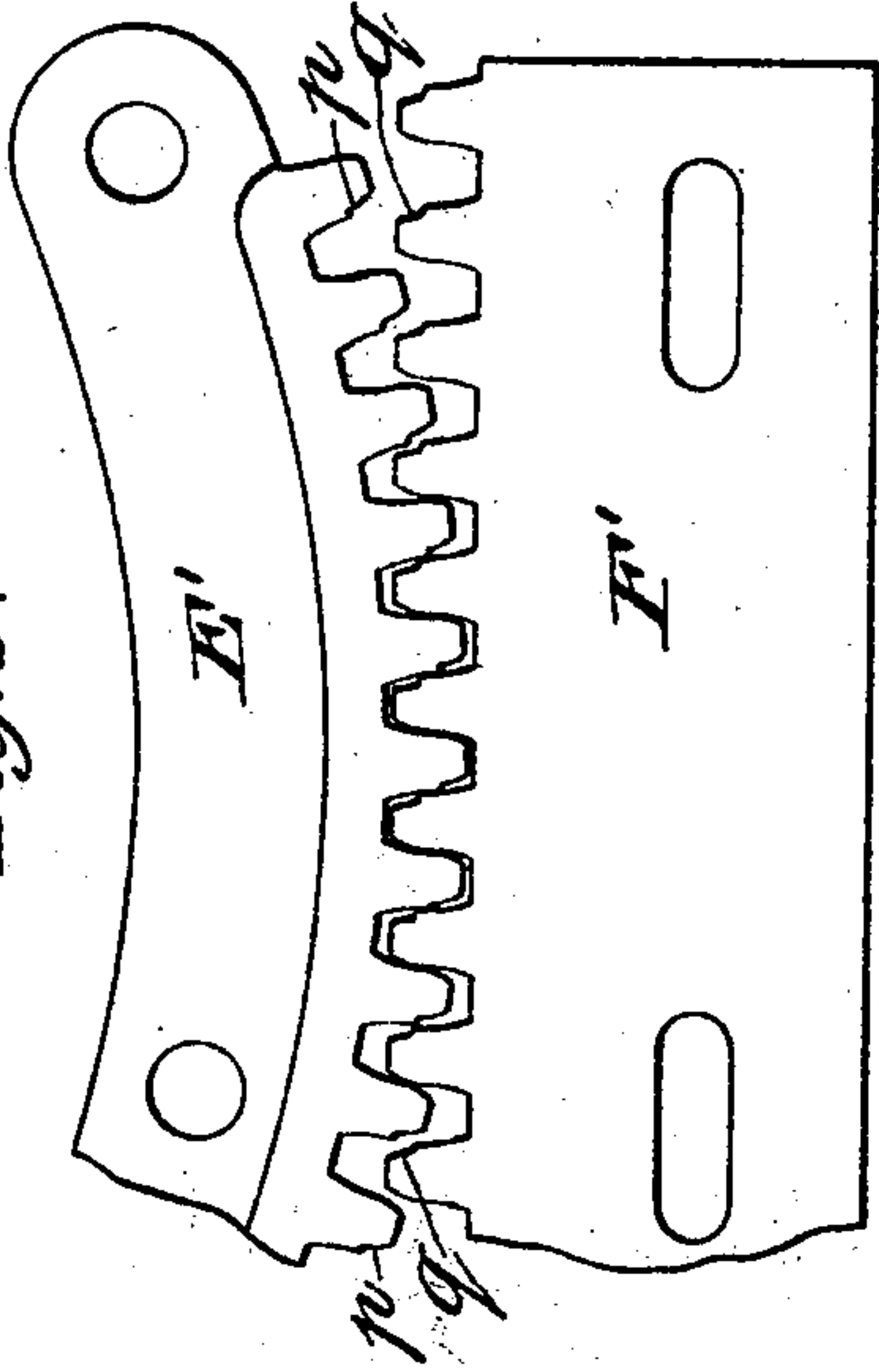


Fig. 7.

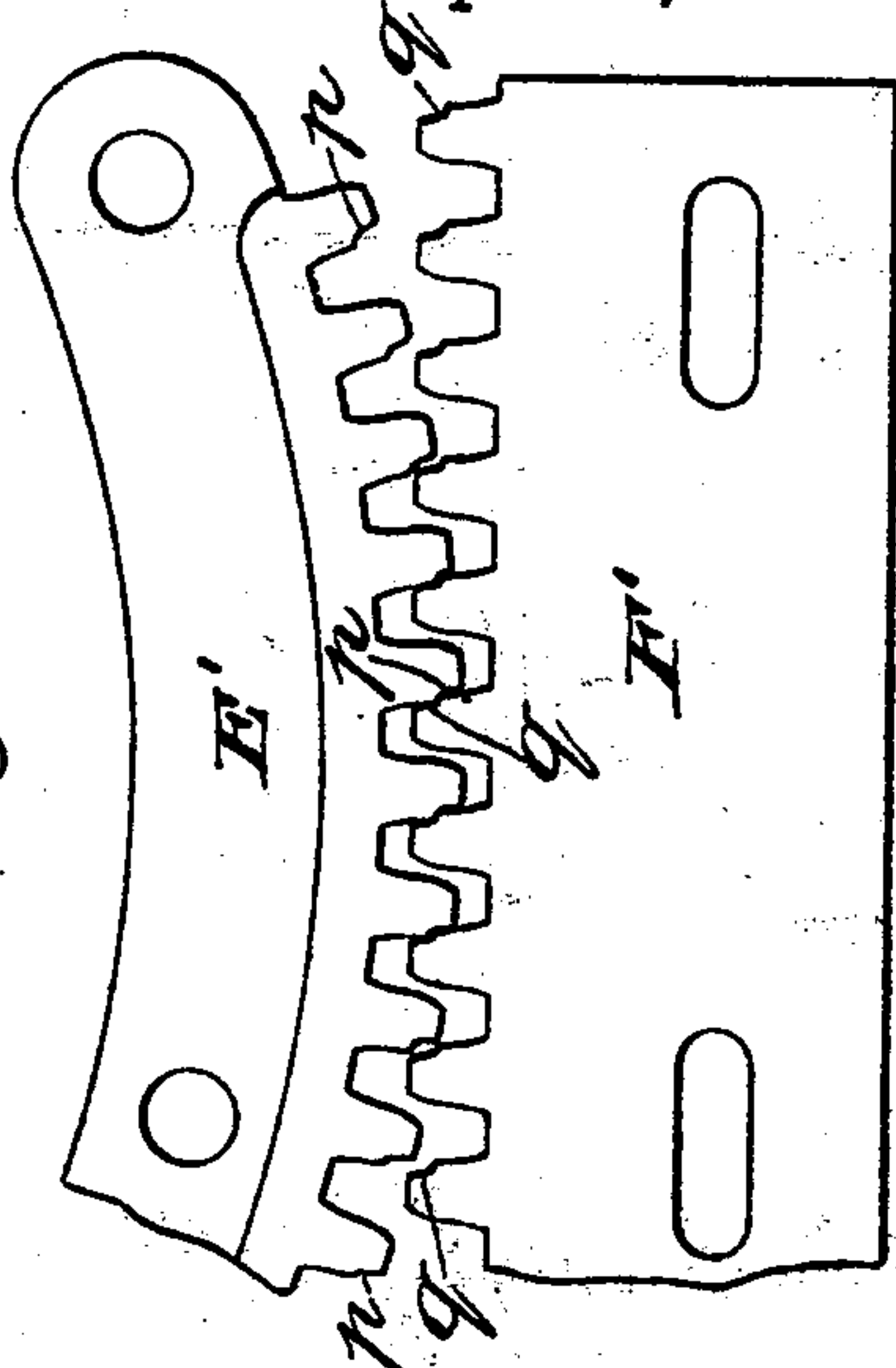


Fig. 4.

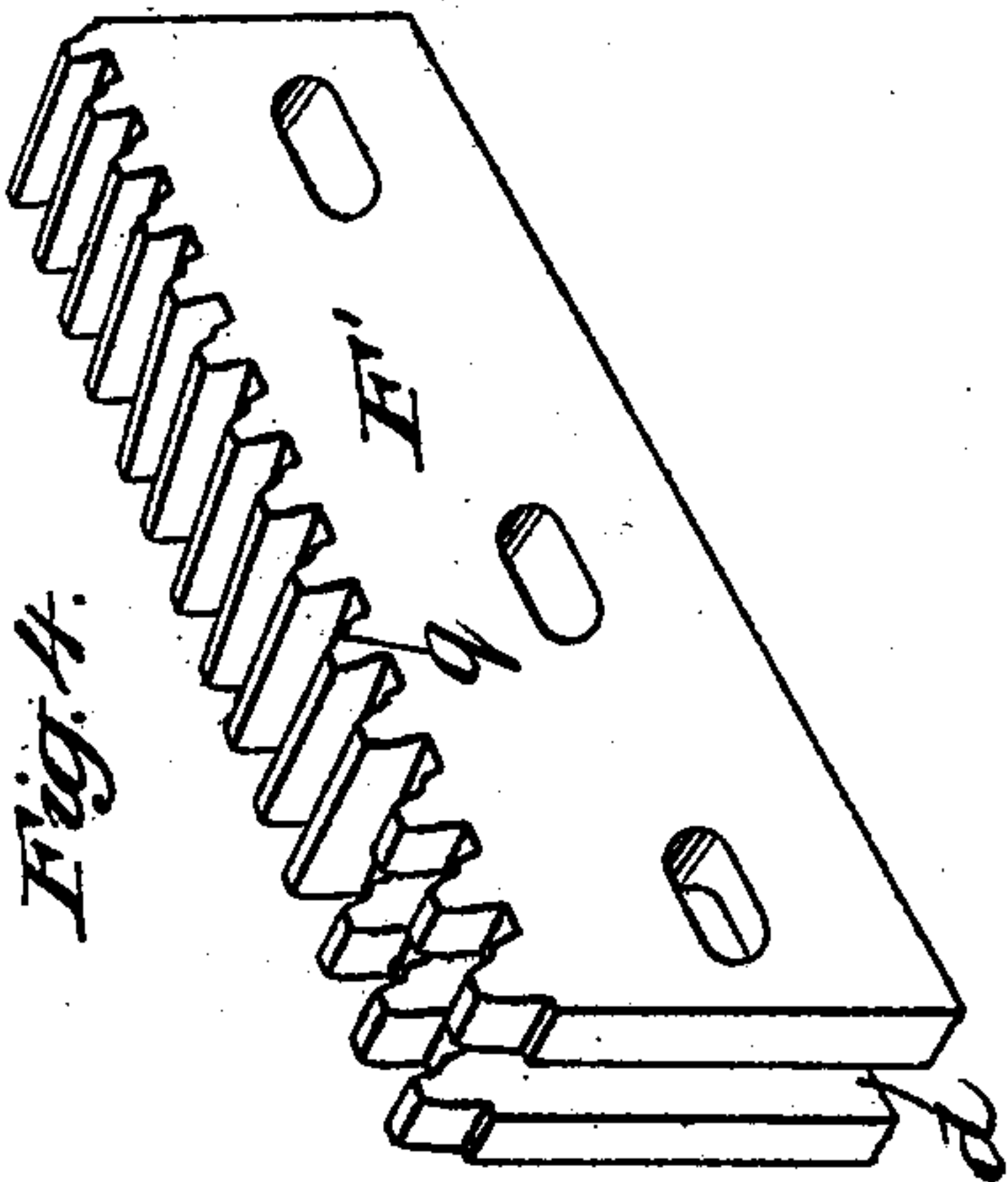


Fig. 3.

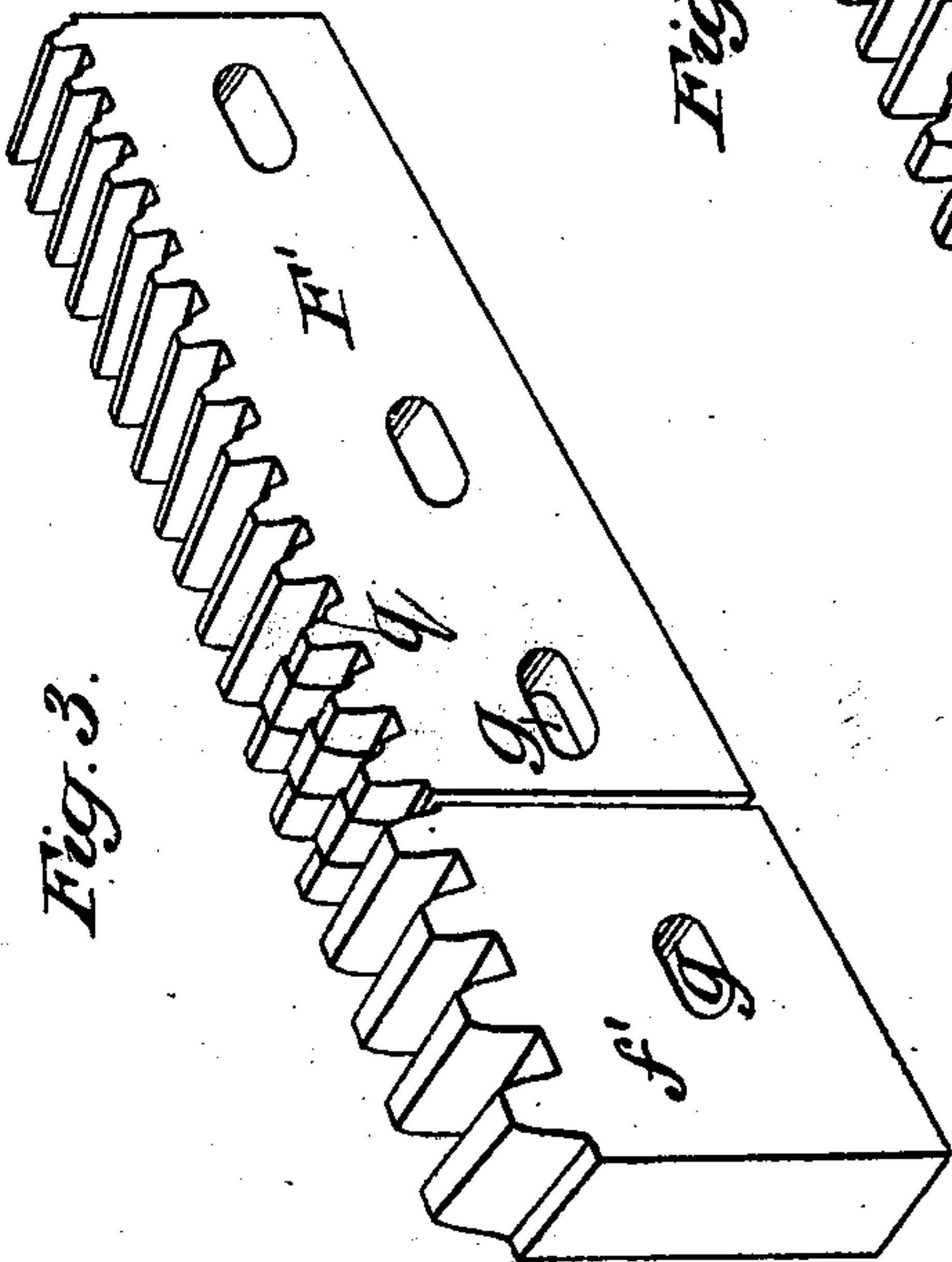
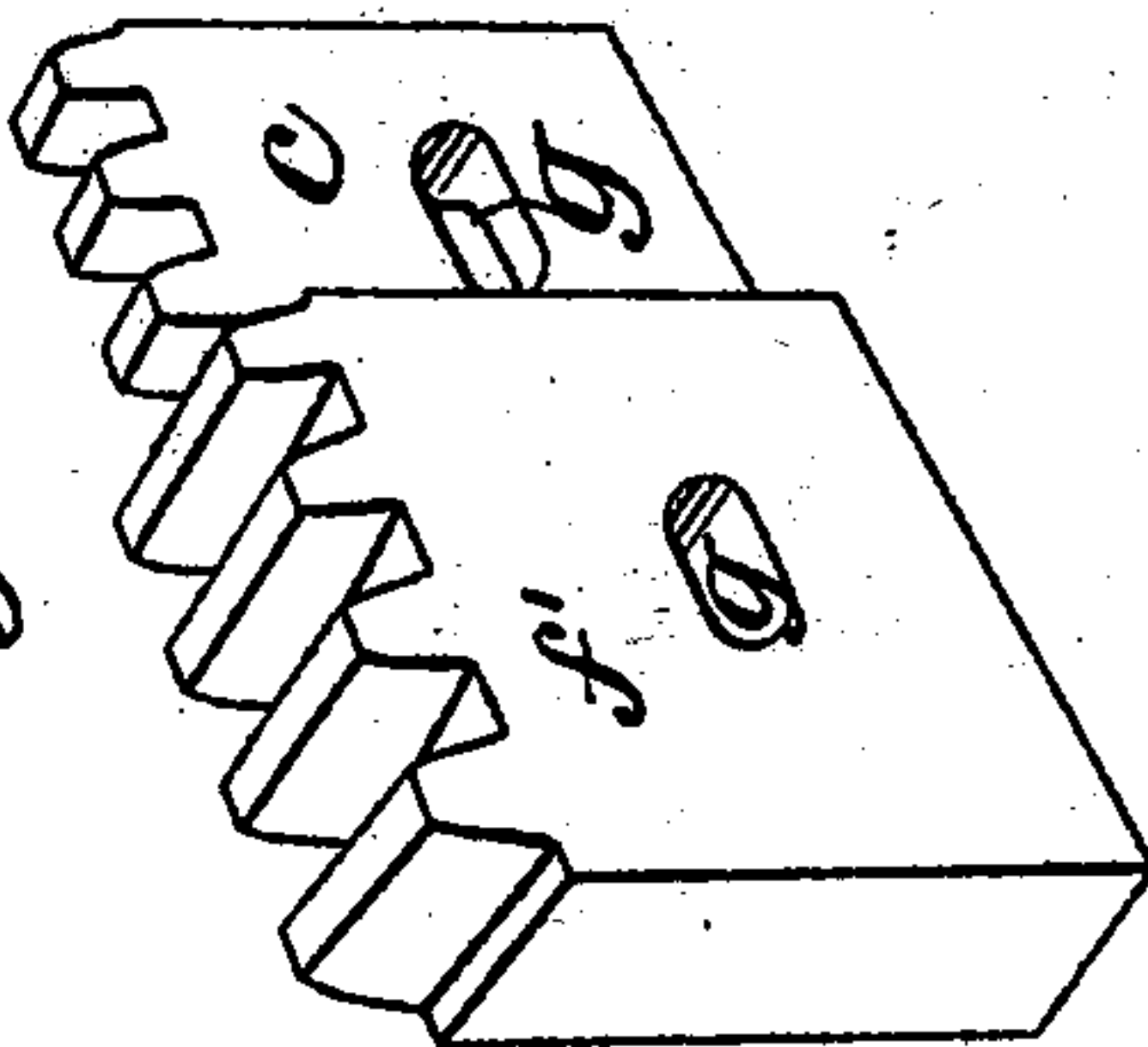


Fig. 5.



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Horn & Howard



# UNITED STATES PATENT OFFICE.

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C. B. COTTRELL & SONS COMPANY, OF WESTERLY, RHODE ISLAND, AND  
NEW YORK, N. Y.

## PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 517,682, dated April 3, 1894.

Application filed November 24, 1893. Serial No. 491,841. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES P. COTTRELL, of Stonington, in the county of New London and State of Connecticut, have invented a new and useful Improvement in Printing-Machines, of which the following is a specification.

This invention relates to what is known as registering gearing used in flat bed cylinder printing machines to bring the cylinder and bed into proper register as they come again into gear with each other after having been disengaged. This registering gearing consists of a toothed segment on the cylinder and a short toothed rack on the bed by which the cylinder and the bed are engaged soon after the bed commences its return movement. With the said segment and rack as ordinarily constructed and applied, the segment being solidly attached to the cylinder and the rack being of one piece and solidly attached to the bed, there is by reason of the slight differences of speed of the cylinder and bed which often occur at the time of the segment and rack coming into gear, much liability to thumping between the cylinder and bed at that time. One object of this invention is to prevent this thumping and to this end one part of the invention consists in the novel construction of the registering rack hereinafter described according to which the rack is divided into two portions of which one is solidly attached to the bed and the other is movable backward and forward thereon under the control of the segment.

Heretofore in flat bed cylinder printing machines in which the driving of the cylinder or cylinders has been from a gear on one side thereof, it has been found necessary to cut away the teeth of the registering segment and rack nearly down to the pitch line or in other words to make the teeth very short in order that while they will gear properly in the running of the machine in printing, the teeth of the rack will pass entirely below and clear of the segment as the bed runs back and forth when the cylinder is tripped. The reason for this cutting away or shortening of the teeth is that if the rack and segment are properly adjusted to run properly

in gear when the cylinder is at the proper level relatively to the bed for printing, the slight turn which is given to the cylinder by the act of tripping, when the driving gear is at the side of the cylinder, throws the teeth of the segment so much out of their normal relation to the rack that if they were of full length the teeth of the segment would ride over the tops of the rack.

Another object of this invention is to prevent this overriding of the teeth of the rack while retaining the full length or depth of the said teeth; and a second feature of the invention consists in a certain construction of the teeth of the segment and rack for this purpose.

I will proceed to describe my invention with reference to the accompanying drawings and afterward point out its novelty in claims.

Figure 1 represents a longitudinal elevation of those portions of a perfecting printing machine which are necessary to the illustration of my invention, one of the side frames being omitted to expose the parts to which the invention relates. Fig. 2 is a diagram representing the pitch lines of the driving gearing of the cylinders. Figs. 3, 4, and 5 are perspective views of the registering rack on a larger scale. Figs. 6 and 7 are diagrams representing portions of the segment and rack illustrating the second feature of my invention. Figs. 8 and 9 are diagrams of some of the teeth of a registering segment and rack of ordinary construction.

In Fig. 1, A is the framing of the machine, B the bed running on the ways *a*. C' C<sup>2</sup> are the first and second impression cylinders. D' D<sup>2</sup> are the forms. E' is the registering segment of the first impression cylinder and F' f' the rack corresponding therewith. E<sup>2</sup> is the registering segment of the second impression cylinder and F<sup>2</sup> f<sup>2</sup> the rack corresponding therewith. The segments, except as to the construction of the teeth of that E' which will be hereinafter explained, are like those in common use and bolted securely to the cylinder. The racks, instead of being each composed of a single piece which is bolted solid to the bed, are each made of two pieces F' and f' or F<sup>2</sup> and f<sup>2</sup> of which one piece F' or F<sup>2</sup> consti-



tuting the greater part of its length is firmly and solidly secured to the bed by screw bolts  $b$  and the other piece  $f'$  or  $f^2$  constituting the end nearest its respective end of the bed and  
 5 which comes first into gear with its respective rack is made loose and capable of sliding or moving lengthwise relatively to the bed and to the respective solidly secured portion  $F'$  or  $F^2$ . In the example represented the  
 10 said movable portions  $f'$   $f^2$  are fitted to the respective solid parts  $F'$   $F^2$  by tenons  $c$  on the one and mortises  $d$  in the other as shown in Figs. 4 and 5 and are secured to the said  
 15 solid parts and to the bed by screw bolts  $e$  which pass through holes  $g$  in the said parts  $f'$   $f^2$ , which holes are sufficiently elongated horizontally to permit a limited movement of the said portions  $f'$   $f^2$  lengthwise.

It will be observed by reference to Figs. 3, 4,  
 20 and 5, that certain of the teeth at the junction of the two portions of the rack are divided being partly in the tenon of the portion  $f'$  or  $f^2$  and partly on opposite sides of the mortise of the solid part  $F'$  or  $F^2$ . A spring  $h$  is represented as secured to the bed opposite the  
 25 end of each of the movable portions  $f'$   $f^2$ .

The operation of the racks so far as it depends upon the construction hereinabove described is as follows: As the cylinder revolves  
 30 and the bed, moving in the same direction, brings the rack into gear with the segment, the loose portion of the rack comes first into gear, and in case of the cylinder at this time moving a little faster than the bed, the loose  
 35 portion  $f'$  or  $f^2$  will be moved outward a little by the segment from its corresponding solid part  $F'$  or  $F^2$  and thus prevent a thump. By the time the segment comes into gear with the teeth in the solid portion of the rack the  
 40 bed will have reached the speed of the cylinder and printing may begin, the rack holding the cylinder in proper register, while the segment is in gear with those teeth of the rack which are divided between the solid and  
 45 loose portions thereof by the mortise and tenon, it brings the teeth of the loose portion into normal relation with those on the solid portion ready for the next operation. The spring  $h$  serves to hold the loose portion of  
 50 the rack against accidentally working too far out from the solid portion and is not intended to exert any pressure while the two portions of the rack are in normal relation.

The new construction of the teeth of the registering rack and segment whereby they  
 55 are permitted to be made of full length without the teeth of the segment riding over those of the rack is illustrated on the first impression cylinder  $C'$  in Fig. 1, but on so small a  
 60 scale as to be hardly perceptible and I have therefore shown it on a larger scale in Figs. 3, 4, 6 and 7. The same construction might be adopted for the segment and rack of the second impression cylinder  $C^2$ , but I have represented them as having the teeth cut away or  
 65 shortened in the usual way. To explain more fully the object of this new construction of the

teeth I will refer to the diagram Fig. 2 in which the cylinders are driven by a train of gearing  
 70  $ij k l m n^2 n'$  the gear  $n'$  on the cylinder  $C'$  being driven at one side by or through the gear  $n^2$  on the cylinder  $C^2$ . The same circles  $n'$   $n^2$  which represent the pitch lines of the cylinder gears may also be understood to represent the circumferences of the cylinders. 75  
 The line  $o o$  indicates the level of the forms. Now when the cylinder  $C'$  is lifted or tripped independently of that  $C^2$  there will be a tendency in the gear  $n'$  and consequently in the cylinder  $C'$  to turn forward in the direction 80  
 of the arrow shown on it and a tendency to turn back the gear  $n^2$  in the opposite direction, but as the gear  $n^2$  cannot turn back, being constantly held and pressed forward by the driving gear  $m$  behind it, the gear  $n'$  must 85  
 be turned forward to the extent to which the cylinder is lifted or tripped and the cylinder and its registering rack are correspondingly thrown forward. The effect of this is illustrated in Fig. 8 which represents a few of the 90  
 teeth of a segment and rack of common construction, Fig. 8 showing the teeth in their normal relation and in gear and Fig. 9 showing their relation when the cylinder is tripped and the segment thrown forward as above described, the crowns of teeth of the segment 95  
 in the latter case being partly over the crowns of those of the rack. It will be understood by this diagram Fig. 9 that if the teeth of the segment and of the solid part  $E'$  of the rack 100  
 were not made very short or cut away or reduced in some way nearly to the pitch line the segment and rack could not pass together when the cylinder is tripped, and that short as they are they cannot gear to their full 105  
 depth. According to my invention I do not cut away or reduce the entire crowns of the teeth or shorten them but I simply cut them away or notch them as shown at  $p q$  in Figs. 3, 4, 5, 6, and 7 to a depth corresponding to 110  
 the lift of the cylinder and to a width, in a direction to their pitch lines, corresponding to the forward movement of the cylinder. The said notches  $p$  in the segment are in the fronts of the teeth, that is to say, on the side 115  
 which is presented in the direction of the rotation of the cylinder, and the notches  $q$  in the rack are in the reverse sides of its teeth. As the height of the lift of the cylinder and the distance which it is thrown forward in 120  
 tripping may be divided between the segment and rack it is only necessary to make the said notches in each of a depth and width equal to or slightly more than half the said height and forward movement and hence a very slight reduction of the teeth is necessary. While thus 125  
 reducing the teeth of the segment and rack on one side I leave them full on the other side and thus on the latter side preserve all the conditions of teeth of ordinary depth and full face 130  
 for facilitating the coming into gear of the segment and rack and for holding them engaged to a desirable depth when in gear as may be understood by reference to Fig. 6 which rep-



resents the segment and gear as they are when the machine is in running order for printing, and moreover when the cylinder is tripped the teeth run in gear as may be understood by reference to Fig. 7 which represents the relation of the notched teeth at that time.

The construction of the teeth of the registering segment and rack with notches *p q* as above described, is applicable not only to perfecting machines but would be also applicable to a single cylinder flat bed two-revolution machine in which the cylinder would be driven from one side.

15 What I claim as my invention is—

1. The combination with the impression cylinder and the reciprocating bed of a printing machine, of a registering segment on the cylinder and a registering rack consisting of 20 two portions which are both attached to the bed but of which one portion is movable lengthwise under the control of the segment relatively to the other portion which is fixed solidly to the bed, substantially as herein set forth.

25 2. The combination with the impression cylinder and the reciprocating bed of a printing machine, of a registering segment on the cylinder and a registering rack on the bed,

the said rack having one portion loose and 30 movable lengthwise relatively to the other portion which is fixed solidly to the bed, and a spring for holding the said loose portion toward the said fixed portion, substantially as herein set forth.

3. The combination with the impression cylinder and the reciprocating bed of a printing machine and a registering rack on the bed, the said rack having one portion loose 40 and movable lengthwise relatively to the other portion which is fixed solidly to the bed, the said loose portion being fitted to the said fixed portion with a mortise in one and a tenon in the other and some of the teeth of the said rack being so divided between said 45 mortise and tenon that a part of one tooth is in the movable portion and a part in the fixed portion of the rack, substantially as herein described.

4. The registering segment and rack of a 50 flat bed cylinder printing machine having their teeth notched or recessed in one side and full on the opposite side, substantially as and for the purpose herein set forth.

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Witnesses:

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