

(No Model.)

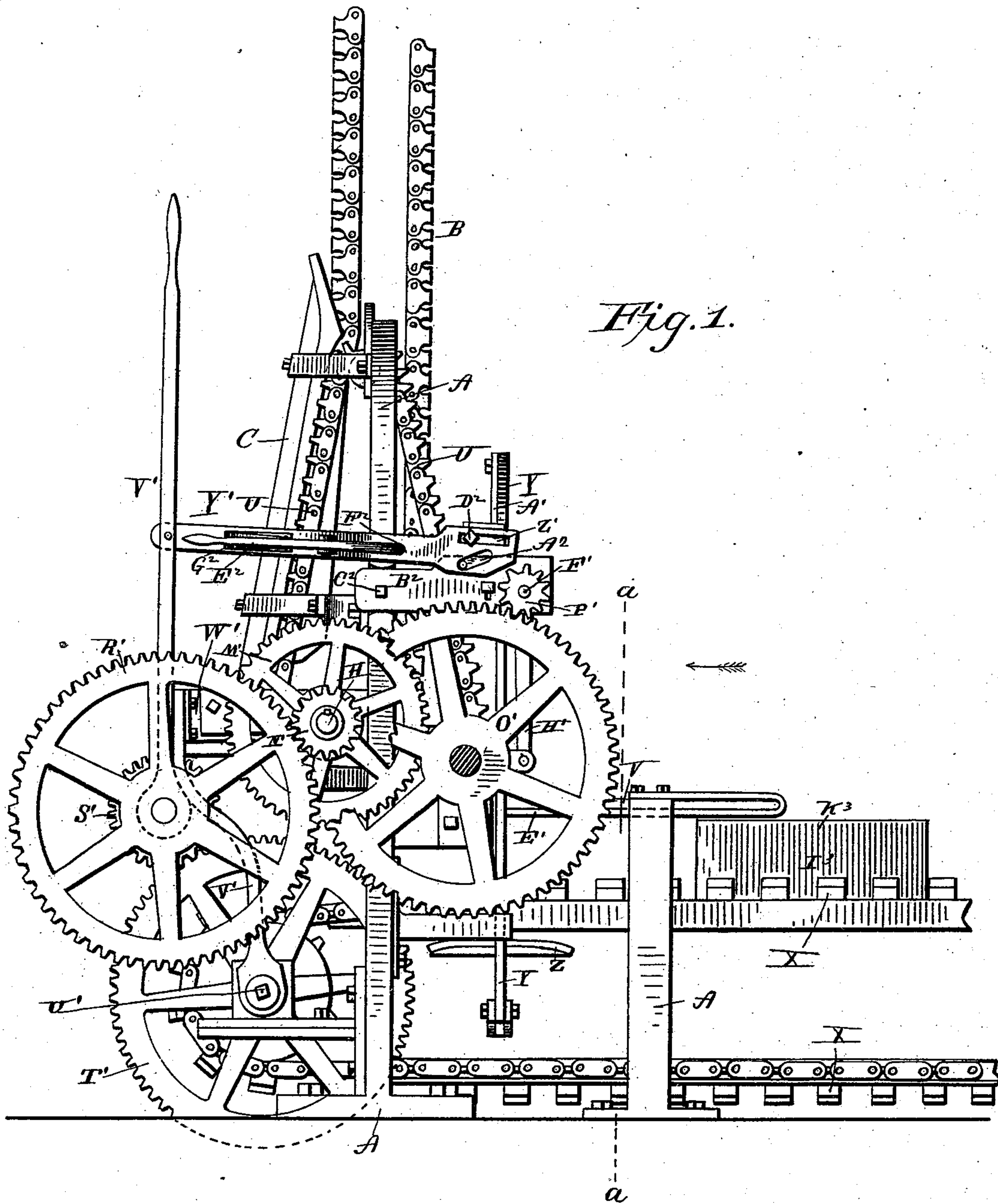
5 Sheets—Sheet 1.

L. KITTINGER.

MATCH MACHINE.

No. 377,943.

Patented Feb. 14, 1888.



Witnesses

*C. A. Davis*  
*John S. Finch Jr.*

Inventor.

*Levi Kittinger.*

By *his* Attorney

*W. M. Allyn.*

(No Model.)

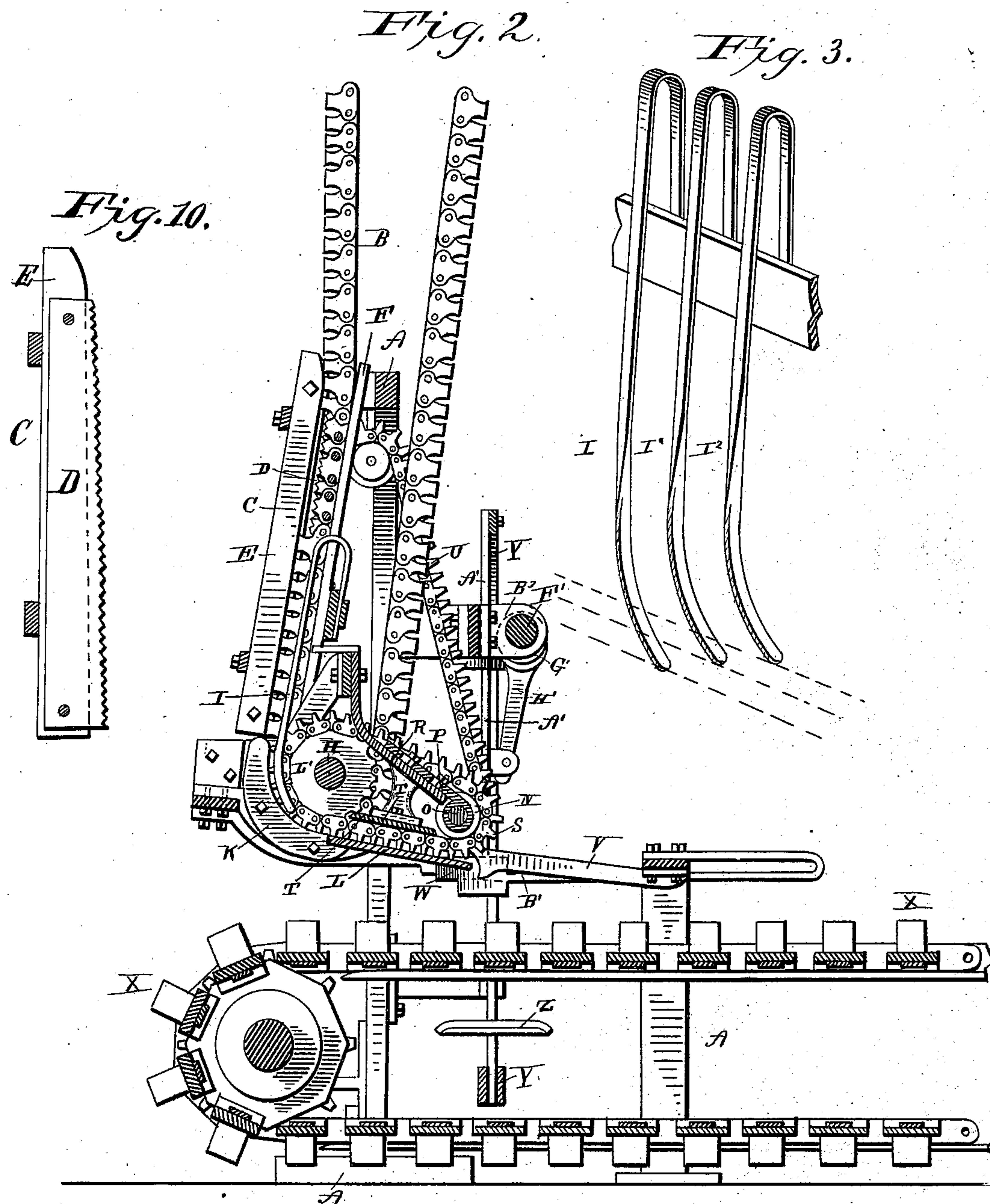
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*C. O. Davis*  
*John S. Finch Jr.*

Inventor

*Levi Kittinger.*

By *his* Attorney

*M. Alexander Jr.*



(No Model.)

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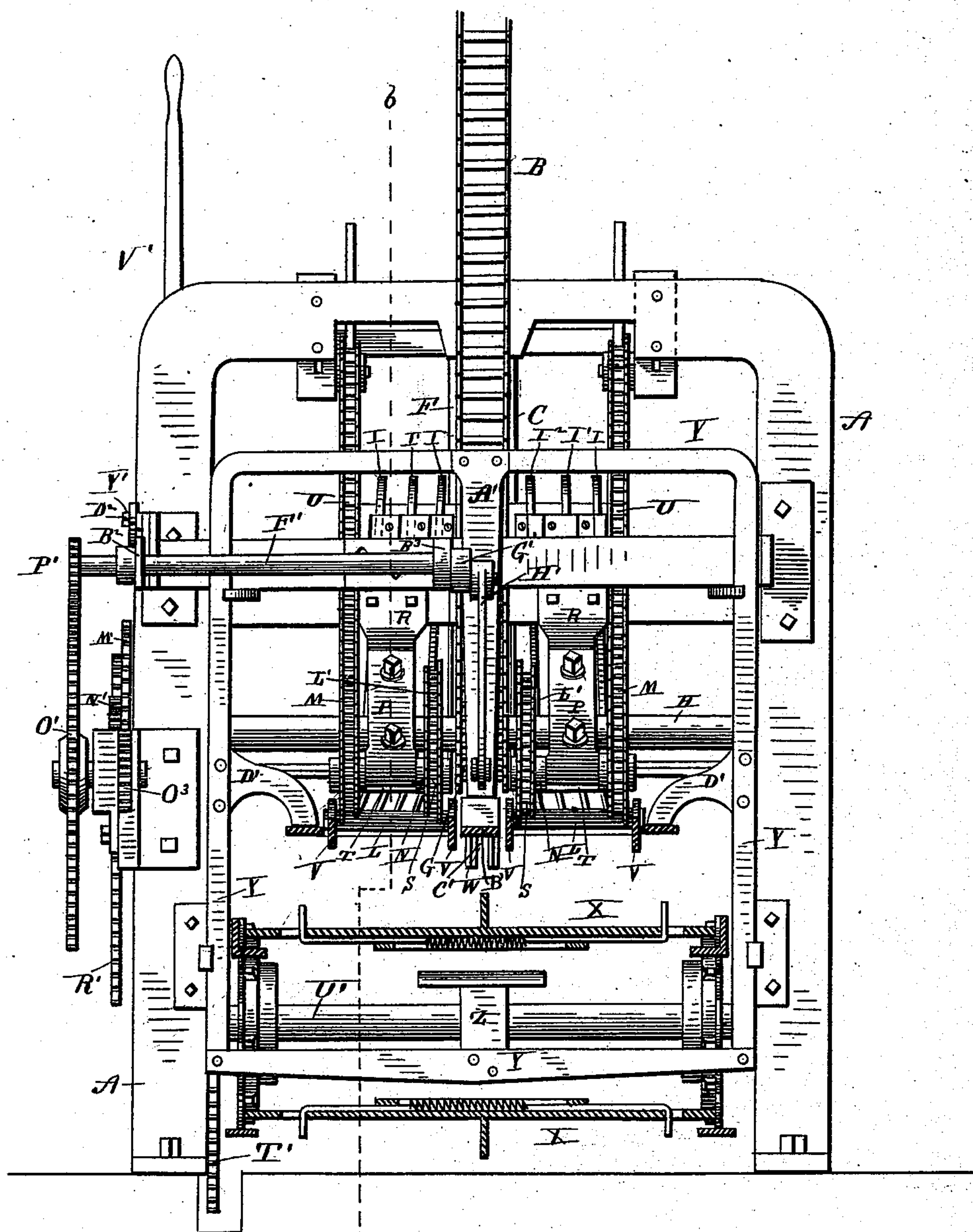
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Fig. 4.



Witnesses

*C. H. Davis*  
*John S. Finch Jr.*

Inventor.

*Levi Kittinger.*

By his Attorney

*W. H. Alexander*

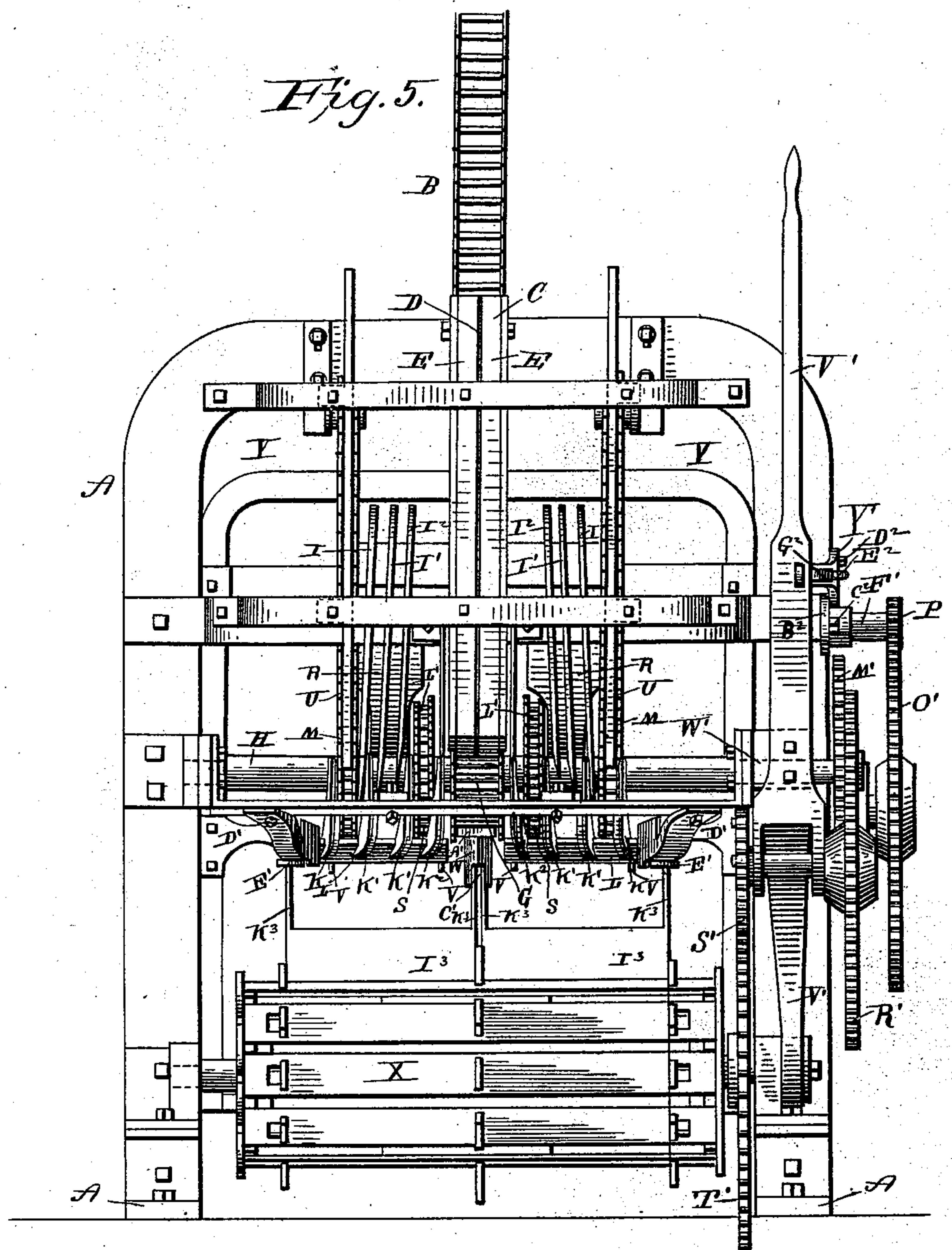
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*John S. Finch Jr*

Inventor  
*Levi Kittinger.*  
By *his Attorney*  
*W. M. Alexander*



(No Model.)

5 Sheets—Sheet 5.

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Fig. 6.

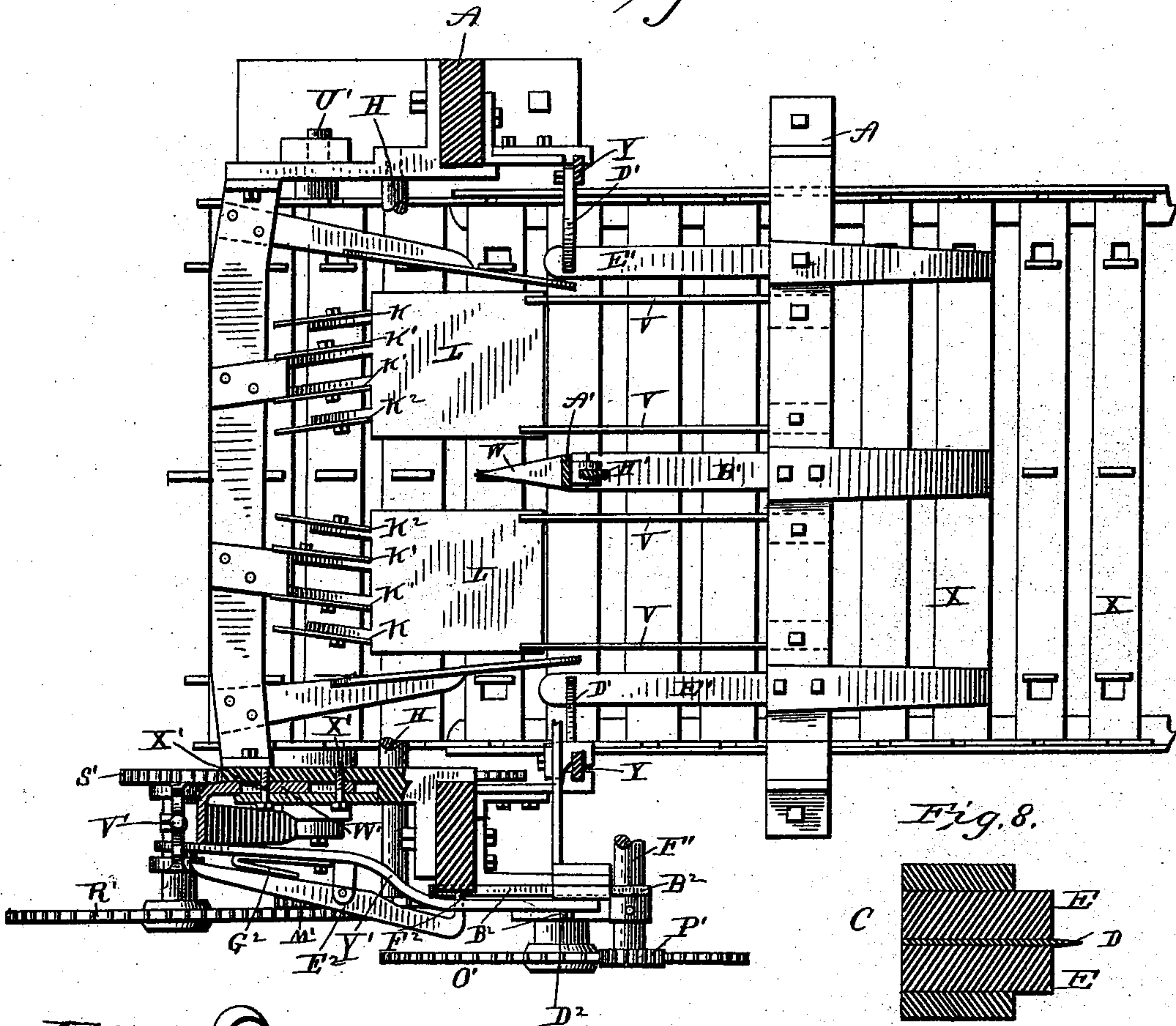


Fig. 8.

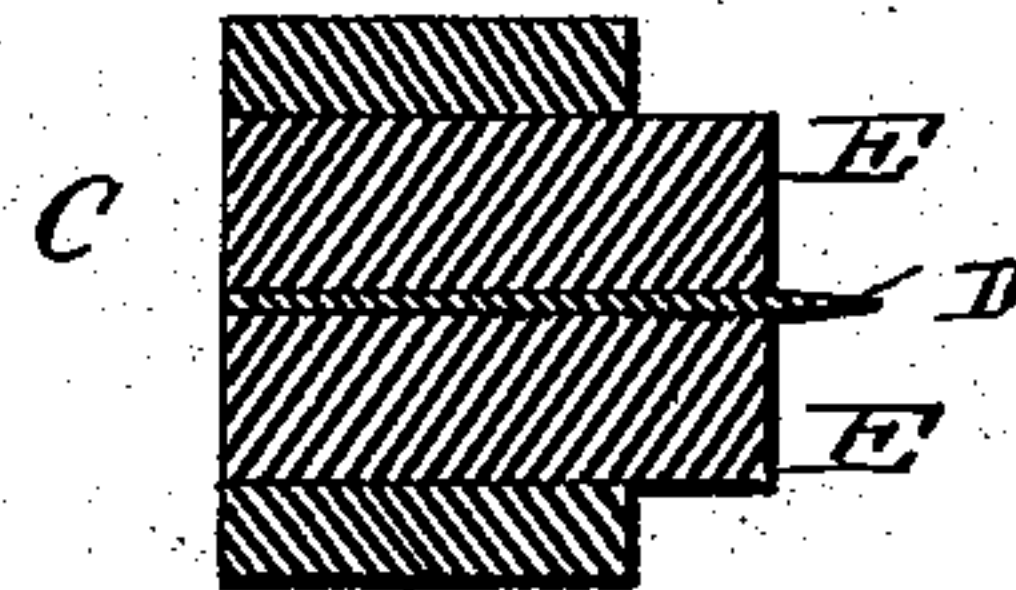


Fig. 11.

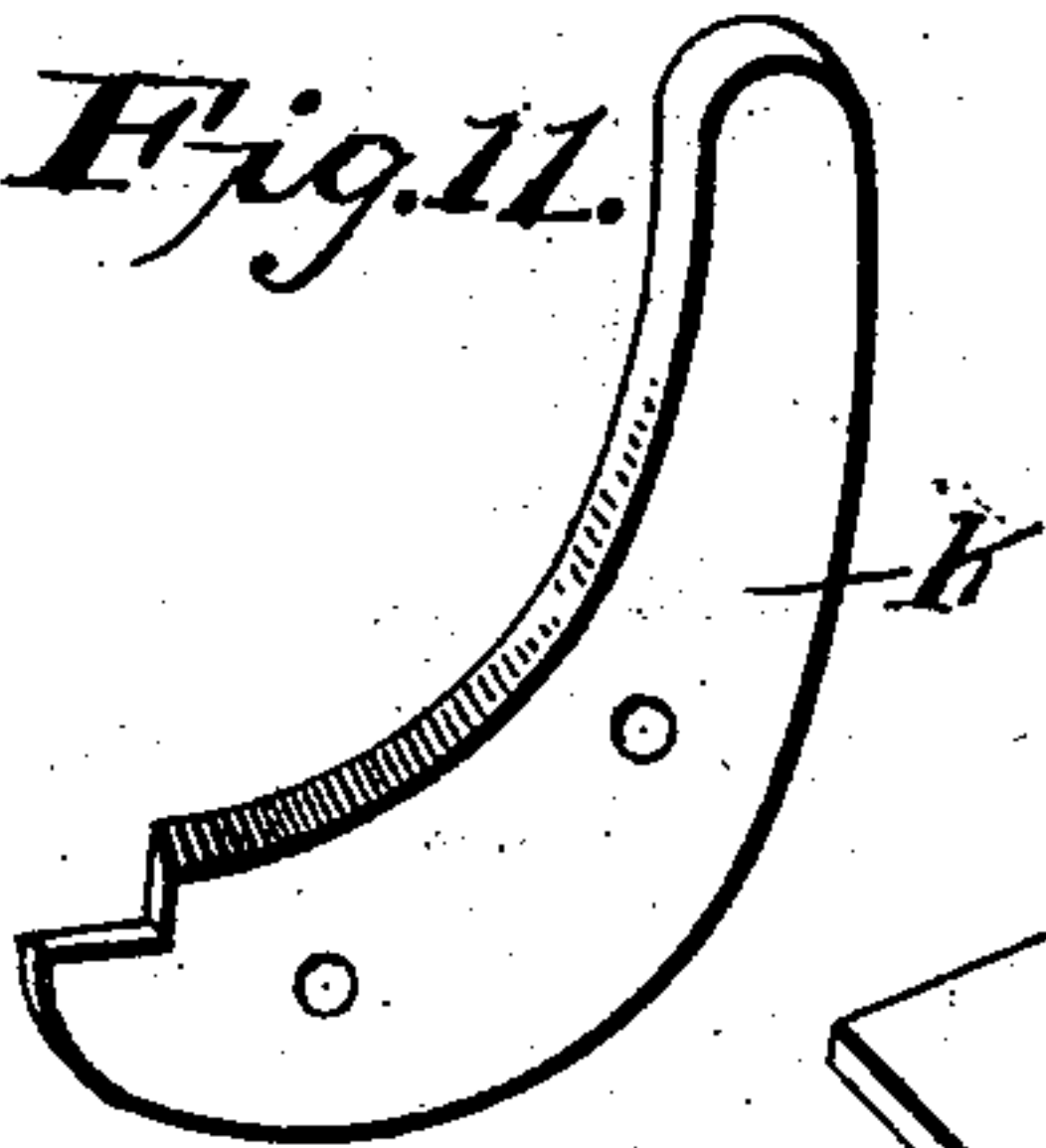


Fig. 7.

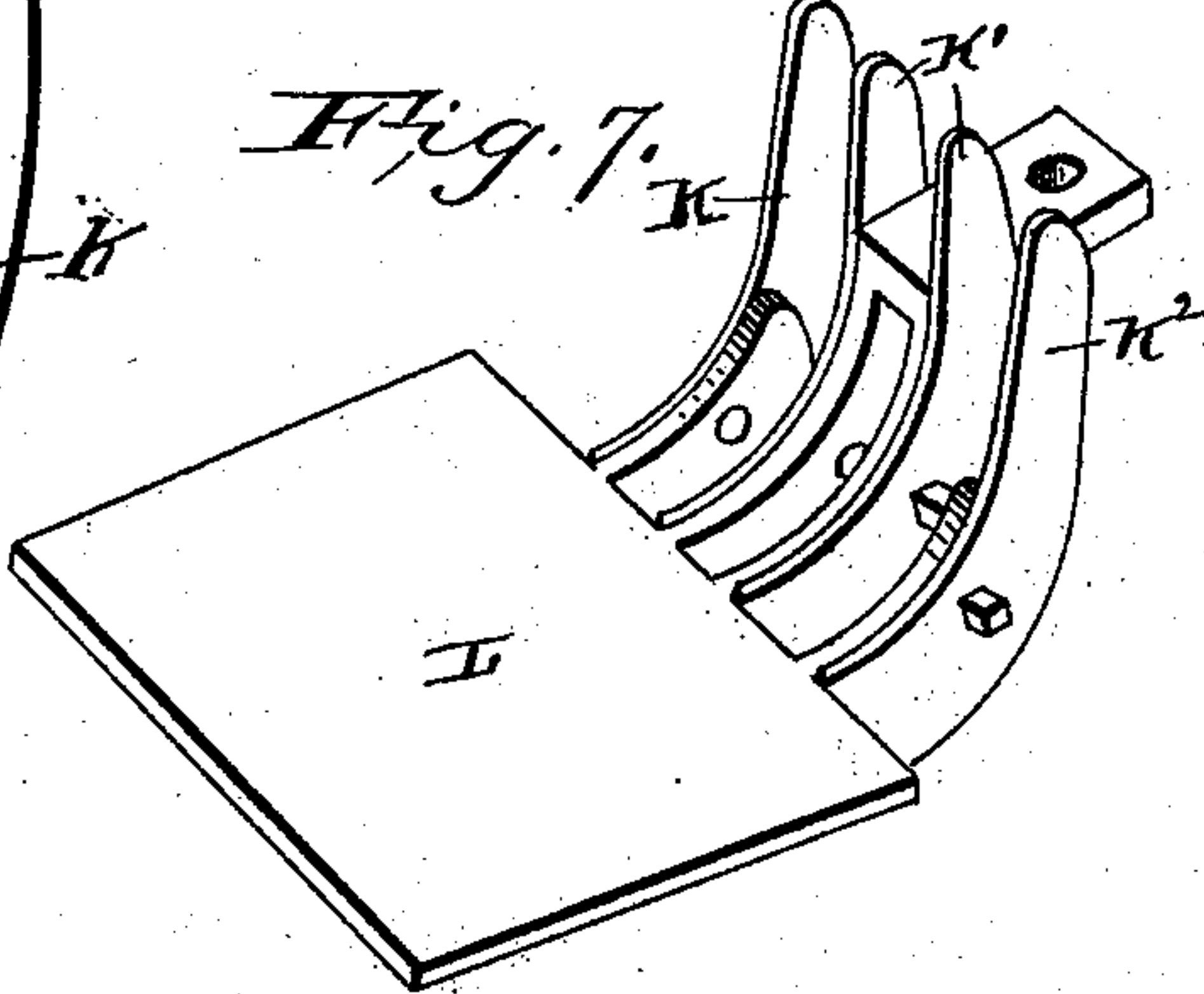
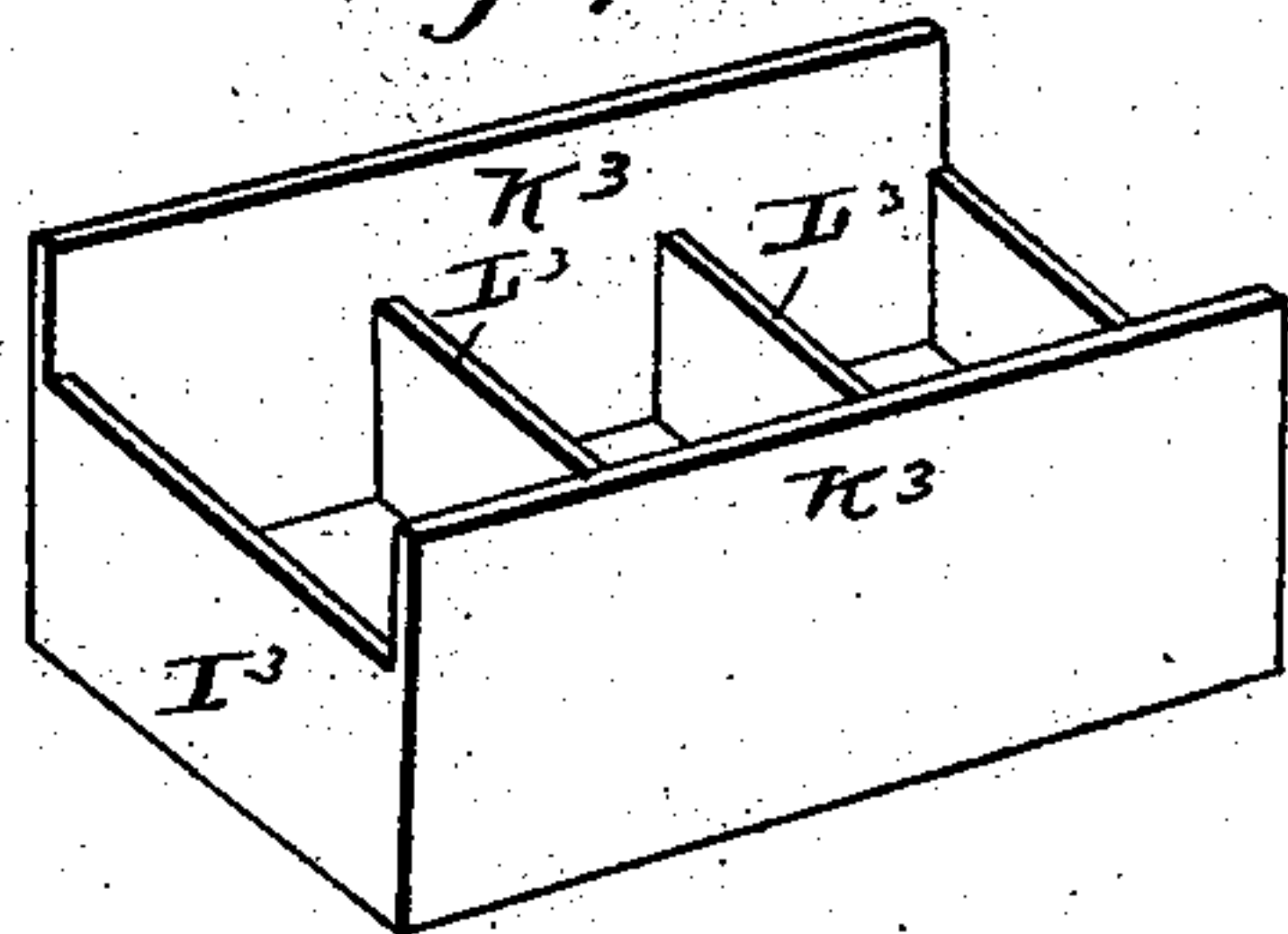


Fig. 9.



Witnesses

C. D. Davis  
John S. Finch Jr.

Inventor.

Levi Kittinger

By his Attorney

W. Alexander



# UNITED STATES PATENT OFFICE.

LEVI KITTINGER, OF AKRON, OHIO.

## MATCH-MACHINE.

SPECIFICATION forming part of Letters Patent No. 377,943, dated February 14, 1888.

Application filed August 16, 1887. Serial No. 247,098. (No model.)

*To all whom it may concern:*

Be it known that I, LEVI KITTINGER, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented certain new and useful Improvements in Match-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to that class of match-machines illustrated in Letters Patent No. 341,809, granted to me May 11, 1886; its object being to improve the splint-dividing mechanism and the match-boxing mechanism.

To this end the invention consists of an improved knife for dividing the splints after they are dipped in the composition with which they are tipped; an improved mechanism for separating the splints one from the other; an improved mechanism for directing the matches to the receiving-trays; an improved conveyer for the trays; an agitator for shaking the trays to cause the matches to settle properly; an improved tray for receiving the matches, and gear for operating parts of the machine jointly or separately.

The invention further consists in certain details of construction and arrangement of parts, hereinafter referred to.

In the drawings I have shown only such parts of the machine as bear immediately on the invention. A complete machine, such as my invention may be applied to, will be found in the Letters Patent hereinbefore mentioned.

In the drawings, Figure 1 is a side elevation of that portion of a match-machine to which the invention relates, one of the gear-wheels being broken away to show part of the mechanism. Fig. 2 is a vertical section on the line *b b* of Fig. 4. Fig. 3 is a detail perspective of a portion of the splint-separating mechanism. Fig. 4 is a section on the line *a a*, Fig. 1, looking in the direction of the arrow. Fig. 5 is an end elevation looking in a direction opposite that of Fig. 4. Fig. 6 is a plan view with the dividing mechanism removed, portions of the machine being shown in section. Fig. 7 is a perspective of another part of the splint-separating mechanism. Fig. 8 is a section through the dividing-knife and holder. Fig. 9 is a perspective of one of the match-receiving trays. Fig. 10 is a detail side elevation of the dividing-knife, one of its clamping-blocks

being removed. Fig. 11 is a detail perspective view of one of the diverging guide-arms.

Referring to the drawings, the frame A of the machine is of suitable form and construction to adapt it to the support of the various parts of the machine.

B is the carrier-chain, which may be constructed similar to and perform the functions of that shown in the Letters Patent before referred to.

*The dividing-knife and adjacent parts.*—The holder C of the knife D consists of two clamping-blocks, E, bolted to the main frame and preferably at a slight angle to the vertical. The knife is provided with a keen edge, which is notched or serrated like a saw. This construction of knife divides the splints more easily and quickly than a straight-edged knife, being in its action similar to that of a saw; but, unlike a saw, the cut is smooth and clean, and no sawdust is formed. The chain B is pressed against the knife-frame by a tongued plate, F, as in the former patent, and straddles the said knife, which increases in projection from the upper end downward sufficiently to pass gradually through the splints as they are carried over it, as shown in Fig. 10. The chain B passes over a pulley, G, on a shaft, H, and from thence to another part of the match-machine.

*The splint-separating mechanism.*—This mechanism consists of a series of spring-arms, I, I', and I'', on each side of the knife, and having their lower ends formed with knife-edges turned in the direction of the splints, so as to engage them as they leave the knife, and a series of fixed arms, K, K', and K'', secured to a plate, L, on each side of the chain B after it leaves the knife. These latter arms are curved upward from below the pulley G to a point adjacent to the lower end of the knife. The inner edges of the said fixed or rigid arms are formed with knife-edges, as shown in Fig. 11. The spring-arms and the rigid arms are parallel and so disposed that the splints, after being divided, must pass between them and be engaged by the knife-edges; but both sets of arms on the two sides of the knife diverge from the point where they first engage the splints to the point where the splints pass from them. It has been found in practice that sometimes the splints would pass from the



knife attached together by tough uncut fibers, and, passing in this condition to the trays, would get entangled in the mechanism and clog the machine. I have devised the means  
 5 just described to remedy this defect, its operation being as follows: The splints when they reach the separating mechanism rest but loosely in the carrying-chains hereinafter described, and the sets of arms on one side diverging from those on the other, the knife-  
 10 edges engaging the splints will carry the cut ends away from each other, and thereby break any uncut or adhering fibers. While both the spring-arms and the rigid arms may be pro-  
 15 vided with blunt edges and act to carry the splints lengthwise by friction only, still I find the knife-edges advantageous, as their action is positive without cutting the match, and slipping or inaction is entirely obviated, as  
 20 the said edges firmly grip the splint.

As match-splints often vary in size, I find it advantageous to make the spring-arms of different lengths—that is, the first longer than the second and the latter longer than the third.  
 25 Thus, if a large splint should precede a small one, the shortest arm will spring back and grip the small splint before the large one is released, and thus separate it from its fellow on the other side. If the arms were all of the  
 30 same length, the large splint would hold them away from the small splint until the latter had proceeded too far to be acted upon by them.

It is to be understood that three arms are described merely to illustrate the operation of this part of my invention, and that any number may be used. The arms  $I$ ,  $I'$ , and  $I''$  are made springing, so as to exert a gentle pressure on the splints, to grip them without cutting  
 40 or otherwise injuring them.

*The splint-directing mechanism.*—The shaft  $H$  carries a sprocket-wheel,  $L'$ , on each side of the pulley  $G$ , and, also, beyond each of the wheels  $L'$  it carries a sprocket-wheel,  $M$ . From each  
 45 wheel  $L'$  to a wheel,  $N$ , on a shaft,  $O$ , supported in adjustable bearings  $P$ , attached to a bracket,  $R$ , on the main frame, extends a chain,  $S$ , provided with spur-links and arranged to travel in one direction on the adjacent plate  $L$ , and  
 50 being held thereon by a plate,  $T$ , arranged above it and preferably supported from the bracket  $R$ . The bearings  $P$  are adjustable, so that the desired tension may be maintained on the chains  $S$ , which serve, in a measure, as carriers for forcing the matches toward the delivery opening or passage, hereinafter referred to. On each side of the knife and parallel with the main carrier-chain is a spur-chain,  $U$ , which serves to support the outer end of the  
 60 splints while they are being cut. This chain  $U$  has suitable bearings near the top of the knife, and passes around the wheel  $M$ , to and around a suitable wheel on the shaft  $O$ , and back again to the bearing at the top of the  
 65 knife. This chain also passes between the plates  $L$  and  $T$  and acts, in conjunction with the chain  $S$ , to carry the matches toward the

point of delivery. The chain  $U$  differs from that shown in my former patent in that it carries the outer ends of the matches along for  
 70 some distance after they leave the main carrier-chain. At the rear end of each plate  $L$  is one or more arms,  $V$ , presenting a somewhat broad and curved edge to the ends of the said plate, but at a sufficient distance therefrom to  
 75 permit the passage of a match and direct it downward after it leaves the chains  $S$  and  $U$ , which pass over their respective pulleys at this point. I also employ a wedge-shaped block,  $W$ , at this point located midway between the  
 80 plates  $L$ , to aid in guiding the matches. I find it advantageous to carry the matches some distance away from the main chain before delivering them to receiving trays below the delivery-passage above referred to, as the separating mechanism has then time to operate and the entire separation of the cut ends of the matches is insured.

I do not confine myself to the exact construction and arrangement of parts above described, as it is evident that various modifications thereof would suggest themselves to a skilled mechanic.

*The tray-conveyer.*—This conveyer  $X$  consists, as in my former patent, of a series of clamps  
 95 linked together and driven by sprocket-wheels; but instead of being inclined is level, thus doing away with devices for preventing the matches from falling from the trays, and which sometimes cause the matches to take fire. The  
 100 conveyer is located under the dividing and depositing mechanism, so as to carry the trays thereunder to receive the finished matches.

*The agitator.*—As shown in the drawings, the agitator, the purpose of which is to continuously jar the conveyer and trays thereon, adjacent to the depositing mechanism, consists of a frame,  $Y$ , encircling or surrounding the upper part of the conveyer at the rear of or  
 105 about coincident with the rear end of the depositing mechanism and movable vertically in sliding bearings on the frame. Centrally from the bottom of the frame  $Y$  projects a block or other suitable device,  $Z$ , which, as the frame is reciprocated vertically, engages with the  
 110 under side of that part of the conveyer which is uppermost, and lifts and jars it in a vertical direction. Centrally from the top of the frame  $Y$  depends an arm,  $A'$ , which engages with and jars the wedge-shaped block  $W$ , which is sus-  
 115 tained on the end of an arm,  $B'$ , possessing more or less resiliency, and engaging with the trays, as hereinafter described, being slotted on the under side, as shown at  $C'$ . On each side of the frame  $Y$  projects inwardly an arm,  
 120  $D'$ , arranged to engage spring-arms  $E'$ , parallel with the arm  $B'$ , and aiding in imparting to the conveyer a somewhat "springy" jarring. To impart motion to the agitator I employ a shaft,  $F'$ , driven by any convenient and  
 125 suitable means and carrying at the end adjacent to the arm  $A'$  a crank or eccentric,  $G'$ , or a wrist-pin, to which is attached a link,  $H'$ , connected to the said arm  $A'$ , so that as the



shaft is rotated the frame Y will be reciprocated vertically. This shaft F' is journaled at its outer end in a bearing, B<sup>2</sup>, pivoted to the frame of the machine at C<sup>2</sup> and at its inner end somewhat loosely in a stationary bearing, B<sup>3</sup>, secured to a portion of the frame of the machine. I find the vertical agitation of the conveyor advantageous over the side "knocker" mentioned in my former patent, in that the motion is such that the matches are caused to readily assume parallel positions in the trays and to pack properly.

*The tray.*—The tray shown in perspective in Fig. 9 consists of a body, I<sup>3</sup>, having the sides K<sup>3</sup> higher than the ends, and provided with dividing walls or partitions L<sup>3</sup>, which form several lateral compartments within the said tray. The tray-conveyer is constructed, as in my former patent, to carry two rows of trays. As the trays pass under the depositing mechanism the inner sides, K<sup>3</sup>, pass through the slot C', under the block W, and the outer sides of the tray are pressed upon by the spring-arms E', and the trays are thus held to the conveyer while the agitator is in operation. The purpose of the cross-partitions is to prevent the matches dropped into the trays from assuming a longitudinal position in the said trays. After the trays have passed the depositing mechanism and have been filled, they are suitably conveyed away to a point where the matches may be transferred to the boxes in which they are sold.

*The operating mechanism.*—The form and construction of the operating mechanism may be varied; but I find that shown to be satisfactory. The shaft H carries on its outer end a gear-wheel, M', and a pinion, N', the gear M' meshing with a pinion, O<sup>3</sup>, on a shaft carrying another gear, O', which may be driven from the source of power in any suitable manner, and which also meshes with a pinion, P', on the shaft F', and thereby drives the latter. The pinion N' drives a gear, R', to the shaft of which is attached a pinion, S', driving a gear, T', on the drive-shaft U' of the tray-conveyer. The gear R' and pinion S' are supported by a lever, V', fulcrumed on the shaft U' and guided by a slide, W', which has bearings in the frame, and is limited in its movement by pins X', engaging in slots therein, as plainly shown in Fig. 6, although any other suitable means may be employed. The lever V' also carries a link, Y', having one end provided with a longitudinal slot, Z', and an inclined slot, A<sup>2</sup>. The inclined slot A<sup>2</sup> engages a pin on the bearing B<sup>2</sup> of the shaft F', the said bearing being pivoted to the main frame, as shown at C<sup>2</sup>. The link Y' is held to a fixed portion of the machine by a pin or bolt, D<sup>2</sup>, which permits it to move longitudinally without vertical movement. It is evident, therefore, that as the lever is moved in a direction which will carry the gear R' away from the gear N', and thus stop the conveyer, the inclined slot A<sup>2</sup> will lift the bearing B<sup>2</sup>, and with it the outer end of the shaft F', and thus throw the pinion P'

and gear O' out of contact and stop the agitator simultaneously with the stoppage of the conveyer. This mechanism is advantageous whenever it is desirable to permit more matches to fall into any one set of trays, as the other mechanism is not disturbed when the conveyer and agitator are thrown out of action.

To hold the parts just mentioned positively in action, I pivot to the link Y' a detent-lever, E<sup>2</sup>, having a finger, F<sup>2</sup>, projecting through the link and engaging a fixed portion of the machine when the parts are all in operative position, a spring being provided and shown at G<sup>2</sup>, Figs. 1 and 6, to prevent accidental disengagement. This detent must be thrown out of action before the lever V' can be moved. By disengaging the link and lever the conveyer and agitator may be independently thrown into or out of gear.

It will be observed that in Fig. 6 of the drawings I have represented the operating devices as they appear when thrown out of gear, while in Fig. 1 the operating devices are shown properly geared ready for operation.

This invention is not confined to the exact arrangement and construction of parts shown, as it is evident that modifications within the scope of the invention would suggest themselves to a skilled workman. However, I have found that in practice the arrangement I have shown is very efficacious.

Having described my invention, what I claim is—

1. In a match-machine, the combination, with the carrier-chain, of the knife holder or clamp C, adjacent to the said carrier-chain, and the dividing-knife D, supported by the said knife-holder and provided with a sharpened and serrated cutting-edge, the said cutting-edge increasing in projection from one end to the other, for the purpose herein described.

2. In a match-machine, the combination, with a carrier-chain for carrying match-splints and a separating-knife, of a splint-separating mechanism consisting of diverging guides in the line of travel of the said carrier-chain, whereby they are separated longitudinally after being cut by the knife, substantially as described.

3. The combination, with the carrier-chain and separating-knife of a match-machine, of diverging arms arranged in the line of travel of the said carrier-chain and provided with knife-edges to engage the splints, whereby the same are separated longitudinally after being cut by the knife, substantially as described.

4. In a match-machine, a splint-separating mechanism consisting of diverging guides formed of spring-arms, substantially as described.

5. In a match machine, a splint-separating mechanism consisting of diverging guides formed of fixed and spring arms, between which the splints pass after leaving the knife or divider, substantially as described.

6. In a match-machine, a splint-separating



mechanism consisting of diverging guides formed of opposing arms, each provided with knife-edges, substantially as described.

7. In a match-machine, a splint-separating mechanism consisting of diverging guides provided with spring-arms of different lengths, substantially as described.

8. In a match-machine, a splint-separating mechanism consisting of diverging guides formed of fixed and spring arms having knife-edges, the spring-arms being of different lengths, substantially as described.

9. In a match-machine, the combination, with the main carrier-chain, a delivery mechanism located at a distance therefrom, and a knife for cutting the splints carried by the said main chain, of the carrier-chains S and U, arranged upon each side of the main chain and extending to the said delivery mechanism, whereby the cut splints are taken from the main carrier-chain and conveyed to the point of delivery, and supporting-plates L beneath the said chains S and U, substantially as described.

10. The combination, in a match-machine, of a main carrier-chain, a knife inserted between the carrier-chain links to cut the match-splints, diverging arms arranged in the line of travel of the said carrier-chain and adapted to separate the splints longitudinally after they are cut, and the carrier-chains S and U, arranged on each side of the said main chain and extending to a point of delivery somewhat removed from the main chain, whereby the cut and separated splints are taken from the main carrier-chain and deposited at said point of delivery, substantially as described.

11. In a match-machine, the combination, with the carrier-chains and a depositing or dropping mechanism for directing the match-splints from the said chains, of a tray-conveyer traveling horizontally under the said dropping mechanism, and trays on said conveyer to receive the splints as they are directed from the carrier-chains, substantially as described.

12. In a match-machine, the combination of a horizontal traveling tray-conveyer, trays upon the said conveyer for receiving and holding the splints, and a vertically-moving agitator adapted to strike the said conveyer, whereby it is jarred in a direction perpendicular to its line of travel, substantially as described.

13. In a match-machine, the combination of a tray-conveyer and an agitator provided with arms arranged to impart blows to the conveyer in alternately-opposite directions.

14. In a match-machine, the combination, with a horizontal tray-conveyer and spring-arms attached to a fixed portion of the machine, of a vertically-moving agitator provided with arms arranged to engage the spring-arms and to impart blows in alternate directions to the conveyer.

15. In a match-machine, the combination, with a depositing mechanism, of a wedge-shaped block acting to separate the ends of the splints at the point of deposit and slotted on the under side to guide the match-receiving trays, substantially as described.

16. In a match-machine, the combination, with an agitator and tray-conveyer engaged thereby, of a slotted block sustained by a spring-arm and arranged to be engaged by the agitator and receive the edges of the trays, substantially as described.

17. The combination of the match carrying and dropping mechanism, the slotted guide B', the horizontally-traveling conveyer, and the match-trays carried by the said conveyer and adapted to receive the matches as they come from the dropping mechanism, the said trays being provided with vertically-extending side walls which enter the slotted guide B', substantially as described.

18. The combination of the match carrying and dropping mechanism, the horizontally-traveling conveyer beneath the said dropping mechanism, an agitator adapted to jar the said conveyer, and trays upon the said conveyer adapted to receive the matches from the dropping mechanism, the said trays being provided with lateral division-walls to prevent the matches assuming a horizontal position in the trays when jarred by the agitator, substantially as described.

19. In a match-machine, the combination, with a depositing mechanism, a slotted guide, B', and a tray-conveyer, of a tray for receiving the matches, provided with side walls higher than the end walls and having lateral partitions, substantially as and for the purpose described.

20. In a match-machine, the combination, with a tray conveyer and agitator, of a driving-gear for the same, consisting of a train of gear members of which are mounted on a lever the fulcrum of which is the axis of another member of the gear, and a shaft driven by the gear and mounted upon pivotal bearings controlled by the said lever, substantially as described.

21. The combination, in a match-machine, of a shaft, F', journaled in a movable bearing, B<sup>2</sup>, and a link, Y', provided with a longitudinal and an inclined slot and movable longitudinally, the longitudinal slot guiding the link on a fixed part of the machine, and the inclined slot engaging a pin on the movable bearing B<sup>2</sup>, to move it, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

LEVI KITTINGER.

Witnesses:

F. A. WILCOX,  
A. H. NOAH.