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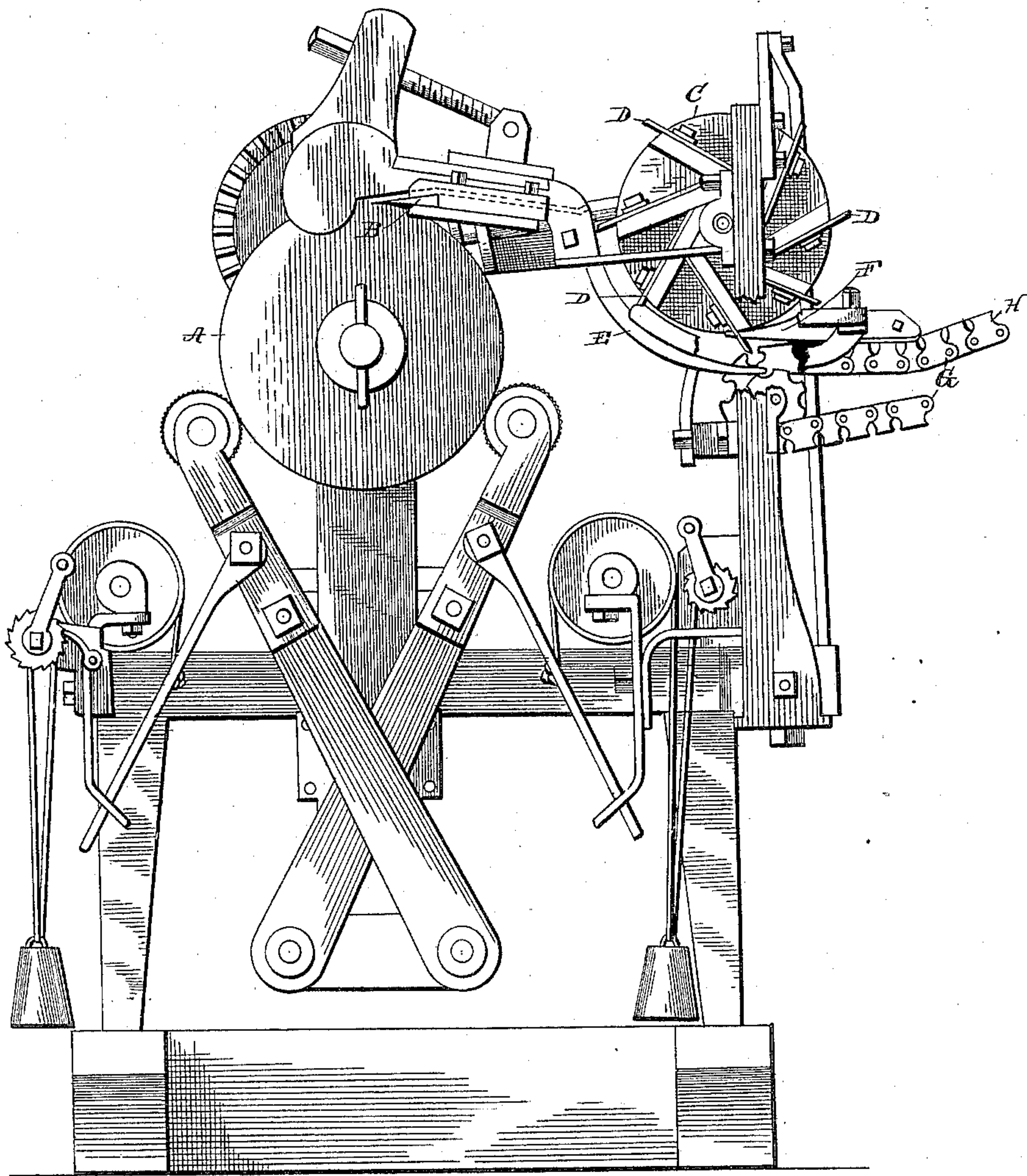
L. KITTINGER.

METHOD OF MAKING MATCHES.

No. 341,810.

Patented May 11, 1886.

Fig. 1.



WITNESSES

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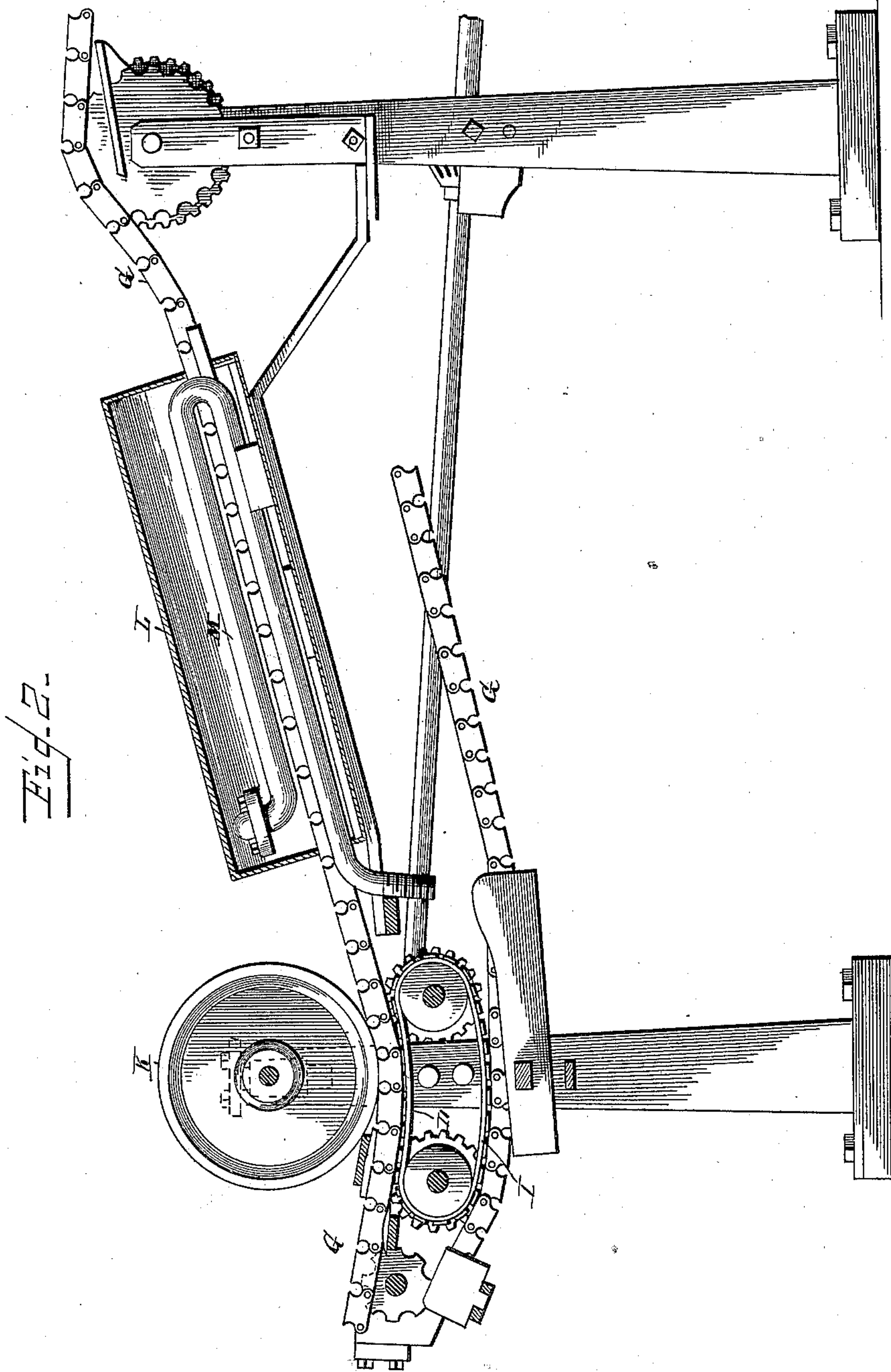
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(No Model.)

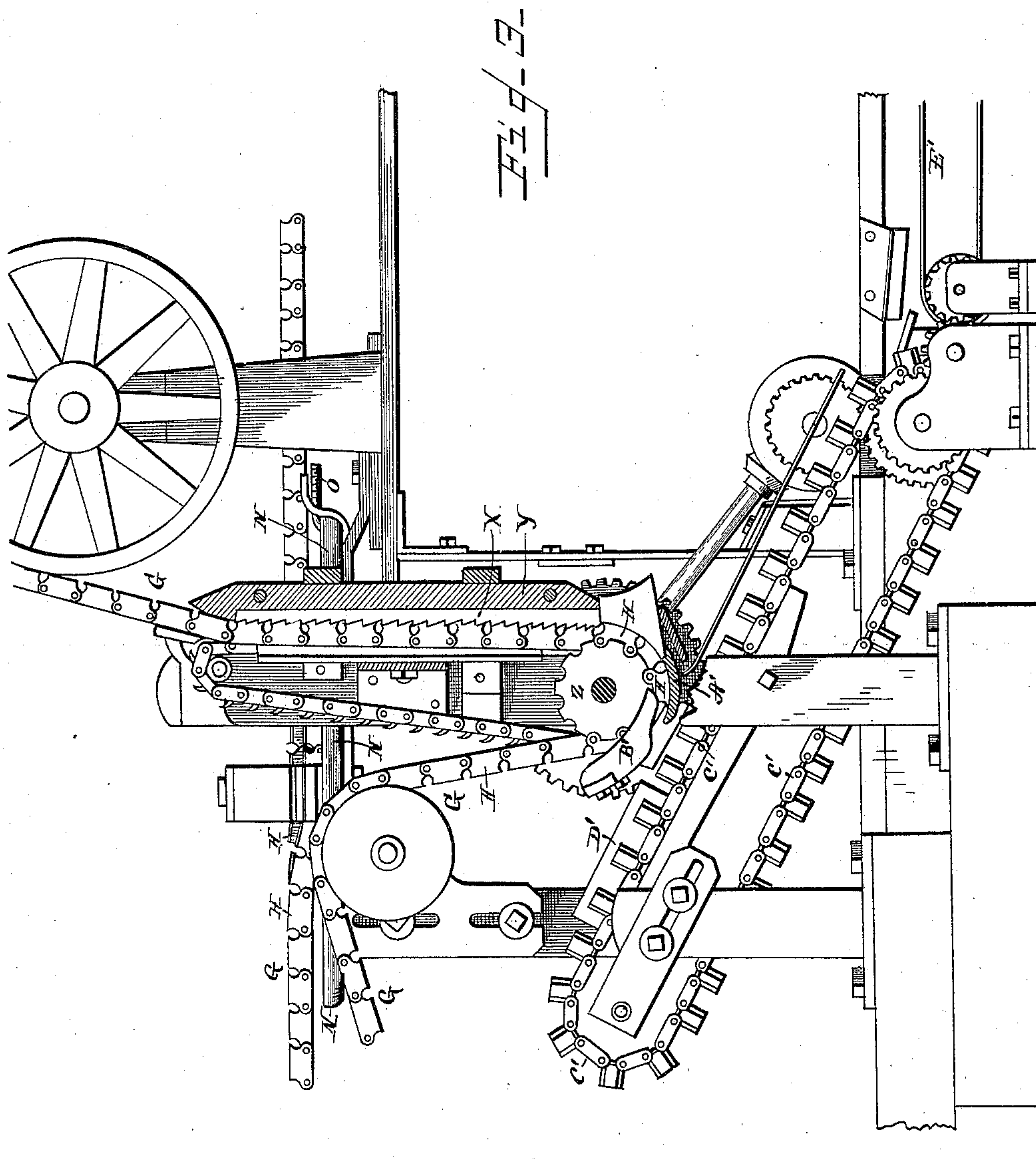
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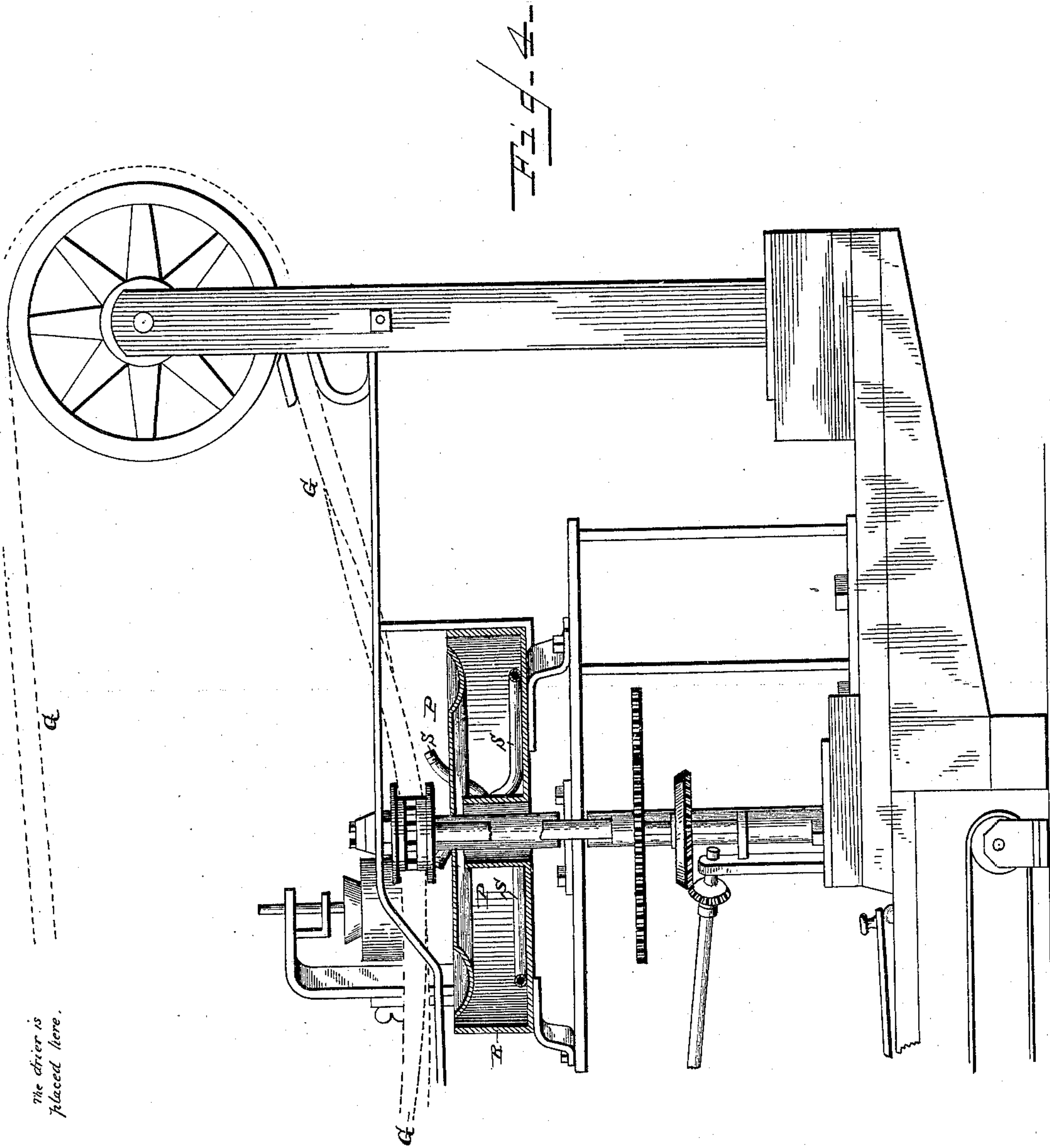
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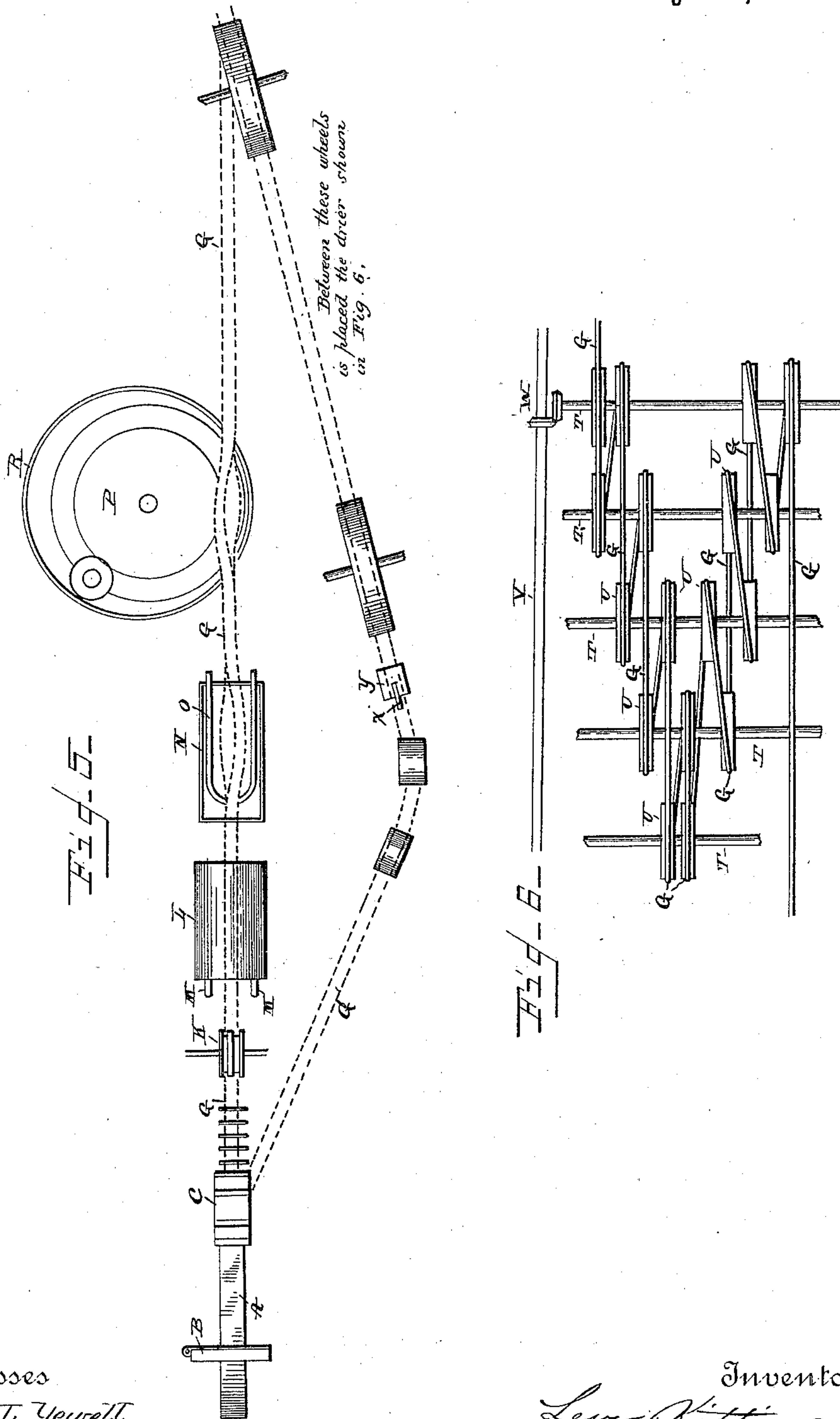
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METHOD OF MAKING MATCHES.

No. 341,810.

Patented May 11, 1886.



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UNITED STATES PATENT OFFICE.

LEVI KITTINGER, OF AKRON, OHIO.

METHOD OF MAKING MATCHES.

SPECIFICATION forming part of Letters Patent No. 341,810, dated May 11, 1886.

Application filed February 25, 1886. Serial No. 193,116. (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
5 invented certain new and useful Improvements in the Method of Making Matches, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain improvements in the process of manufacturing matches; and it consists of a process comprising a series of successive steps carried out through the operation of a single machine, whereby the matches may be made complete, boxed, and
15 carried away, from a block of wood cylindrical in shape, and of the length of two ordinary matches. The said process is substantially effected by means of a machine for which I made application the 29th day of October,
20 1885, Serial No. 181,316; but in order to facilitate the description of the said processes or methods I refer therein to the accompanying drawings, illustrating a form of machine by which the said methods may be accomplished,
25 and in which drawings Figures 1, 2, 3, and 4 represent a side elevation of the device, with parts in section; Fig. 5, a diagrammatic view, and Fig. 6 a plan view of a form of drier.

The block A, Fig. 1, is supported in any
30 suitable manner so as to have a revolving movement. On the periphery of this block A rests a knife, B, given a reciprocatory movement by any suitable means. This knife is caused to reciprocate, as such a motion will
35 make a smoother and better cut than would a stationary knife. The knife having cut a continuous slice from the block, the said slice passes to the cutter-head C, having on it a series of knives, D, which, as the said cutter-head revolves, engage with and divide the
40 slice into splints, the usual shape of which is square in cross-section and double the length of a finished match. The knives D carry the splints along the curved frame E till the fingers F are reached, which fingers direct the travel of the splints away from the cutter-head knives and cause them to fall into the carrier
45 G, which is constantly moving under the end of the frame E at a speed corresponding to that of the said cutter-head. The carrier G consists in this instance of a double and parallel series of pivoted links, H, with the ends

recessed to receive and retain the splints, the said carrier being in the form of an endless chain. The splints having been deposited in
55 the chain, are carried thereby to what may be termed the "crimper." This latter device may consist of a moving and semi-flexible support, I, for the chain or carrier, and a suitably-flanged wheel, K, which is adjustably supported
60 over the said carrier, and in operation bears with more or less force on the sticks, the flanges forming slight lateral grooves and consequent widening of the splint at the point of contact, so as to prevent any longitudinal
65 movement of the said splints or sticks on the carrier, especially when the operation of dipping is being performed. The splints are next carried through a heating-chamber, (shown at L, Fig. 2,) the necessary heat being supplied
70 by the steam-pipes M. This heating of the splints is preparatory to the process of dipping. To perform this operation, the carrier is caused to be twisted sufficiently to dip each end of the splints in the pan N, Fig. 3, said
75 pan containing paraffine or other proper substance, kept in a liquid state by steam-pipes, the projecting ends of which are shown at O, Fig. 3. Having received what may be termed the "first dip," the splints are then carried
80 by the chain to the composition-pan P, where the operation of dipping is again performed. However, the carrier is twisted sufficiently to cause the splints to assume a position perpendicular to the pan, which latter is made to re-
85 volve at the same speed that the carrier travels. By means of a pan or incasement, R, surrounding the revolving pan and adapted to contain water kept hot by the steam-pipes S, the composition in the pan P is kept liquid.
90

By causing the composition-pan to revolve, the material contained therein may be agitated by scrapers or other suitable means, and the caking of the said material obviated; also, the dipping of the splints directly into the said
95 pan obviates the use of belts or other devices for the conveyance of the composition from the pan to a suitable point where the said composition may be applied to the splints. The object of causing the said pan to revolve is to
100 prevent the splints dragging through the composition during the operation of dipping, and obtaining mechanically the advantages of hand-dipping.

After being properly dipped it is necessary to thoroughly dry the splints before they are cut in two. It is advantageous that the said process should be slow and by air; hence the carrier is caused to travel over a series of drums so arranged as to travel forward and backward, the travel in one direction being longer than in the other, thus giving a slow advancement to said carrier. This manner of travel may be accomplished by providing a series of parallel shafts caused to move simultaneously and carrying drums over which the carrier may pass. To acquire the motion specified, the chain carrier will move forward a distance equal to the space occupied by three shafts, then backward to the intervening shaft, thence forward past a shaft, and thence back again to the shaft that was skipped, and so on. A series of drums may be arranged at each end of the shafts and approaching as they near one end of the entire device, which may be termed the "drier," so that the carrier may move slowly toward one end of the drier, and then slowly return to the place of starting, thus increasing the time of travel with an economy of space.

In practice the time used to thoroughly dry the splints is from twenty minutes to half an hour.

A construction accomplishing the above-mentioned results is shown in Fig. 6, in which the shafts are shown at T, the drums at U, and the drive-shaft at V, bevel-gearing W being used as a means of transmitting the power from the drive-shaft V to the parallel shafts T.

The next step in the process is to cut the double or twin matches in two. The means heretofore used has been a revolving saw; but such is open to objection, inasmuch as more or less connective mechanism must be used, thus to a certain extent complicating the device. This complication I obviate by using a stationary saw or cutter so arranged that the carrier will convey the matches over the said cutter, and thus cause the said matches to be divided. The means I at present prefer to accomplish this object are shown in partial section in Fig. 3. The saw or cutter is shown at X, and is firmly fixed to a suitable holder, Y, from the face of which the said saw projects, the projection being regularly increased from the end at which the matches first engage with it toward the other end.

In order to adapt the cutting devices to the next step in the process, which consists in boxing the matches, the saw is arranged vertically and the carrier caused to pass downward over it, the said carrier finally passing around a sprocket-wheel, Z, and returning to the splinting mechanism. From the bottom of the saw is a curved frame, A', which is shown in Fig. 3 as extending under the sprocket-wheel Z. As the chain carrier passes under the said sprocket-wheel, the links H drop the matches on the said frame A', and fingers B', (shown in elevation,) extending over the edge of the frame A' at a suitable distance

above it, direct the course of the matches to the boxes, which latter (the boxing) forms the next step of the process.

The boxing consists, essentially, in conveying the boxes under the discharge-opening of the cutting devices at such a speed as to permit them to be just sufficiently filled during the operation, and they then are conveyed from the said carrier to a suitable place for packing.

The box-carrying belt, as shown at C', Fig. 3, consists of a series of flexibly-connected clamps, which hold the boxes, one of which is shown at D', and is endless. The said belt is placed on an incline, the boxes being fed from the upper end and discharged at the lower end onto a conveying-belt, E', which carries them to the packing-room.

The belt C' is placed on an angle or incline, so that the matches as they fall from the cutter into the boxes will supply the said boxes gradually from the lower end toward the upper end, thus causing the said boxes to be evenly filled.

In the operation of boxing I prefer to use specially-made boxes—that is, boxes (say of metal) with square corners—and transfer them by hand to the usual commercial boxes, as the expense attending the construction of boxes of sufficient accuracy to operate in conjunction with the device described would be greater than the handling incident to the transferring noted.

The above description is only sufficiently specific to make plain the various methods or processes employed in the making of a match and depositing it in a box, and hence all detail description has been omitted as superfluous.

The various and combined novel processes are as follows: the direct depositing of the splints into the carrier by the splinting mechanism, in contradistinction to the feeding of the splints to a carrier by means of a hopper; the creasing of the splints to prevent longitudinal movement in the carrier; the dipping of the splints directly in the composition-pan, which latter moves at the same speed the carrier travels, thus obviating the splints dragging through the said composition, and doing away with intermediate mechanism; in conjunction with the moving composition-pan, the bringing of the splints perpendicular thereto; the air-drying of the headed twin matches by carrying them forward for a distance, and then backward for a less distance, thus causing them to have a great length of travel, and thus consume sufficient time to thoroughly dry them without causing the mechanism to occupy much space comparatively; the dividing of the twin matches by means of a stationary saw, and thus obviating the mechanism necessary to drive a moving saw; the depositing of the matches in boxes automatically; the imparting of an inclined travel to the boxes, so that they will fill gradually from one end toward the other; the automatic conveyance of the filled boxes away from the boxing-belt;

in combination with the revolving block, the reciprocating knife for cutting a slice from said block preparatory to the formation of the splints; the making continuous and automatic of these several operations of forming the splints, depositing them in a carrier, dipping, and cutting them in two pieces; in connection with the operations included in making a match, the boxing of the same.

10 The above merely sets forth in outline the various novel methods, the invention being specifically set forth in the following claim.

I claim—

15 The method herein described of making, boxing, and carrying the matches away, from a cylindrical block of wood of the length of two

matches, in a single machine, the same consisting in the following steps, to wit: first, reducing the block to splints, then carrying the splints forward and crimping them, then heating them and successively dipping them in paraffine, then dipping them in igniting substance, then drying and severing the splints, and then boxing the matches, the whole forming a continuous method, substantially as 25 specified.

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

LEVI KITTINGER.

Witnesses:

OLIVER P. FALOR,
FONROSE FALOR.