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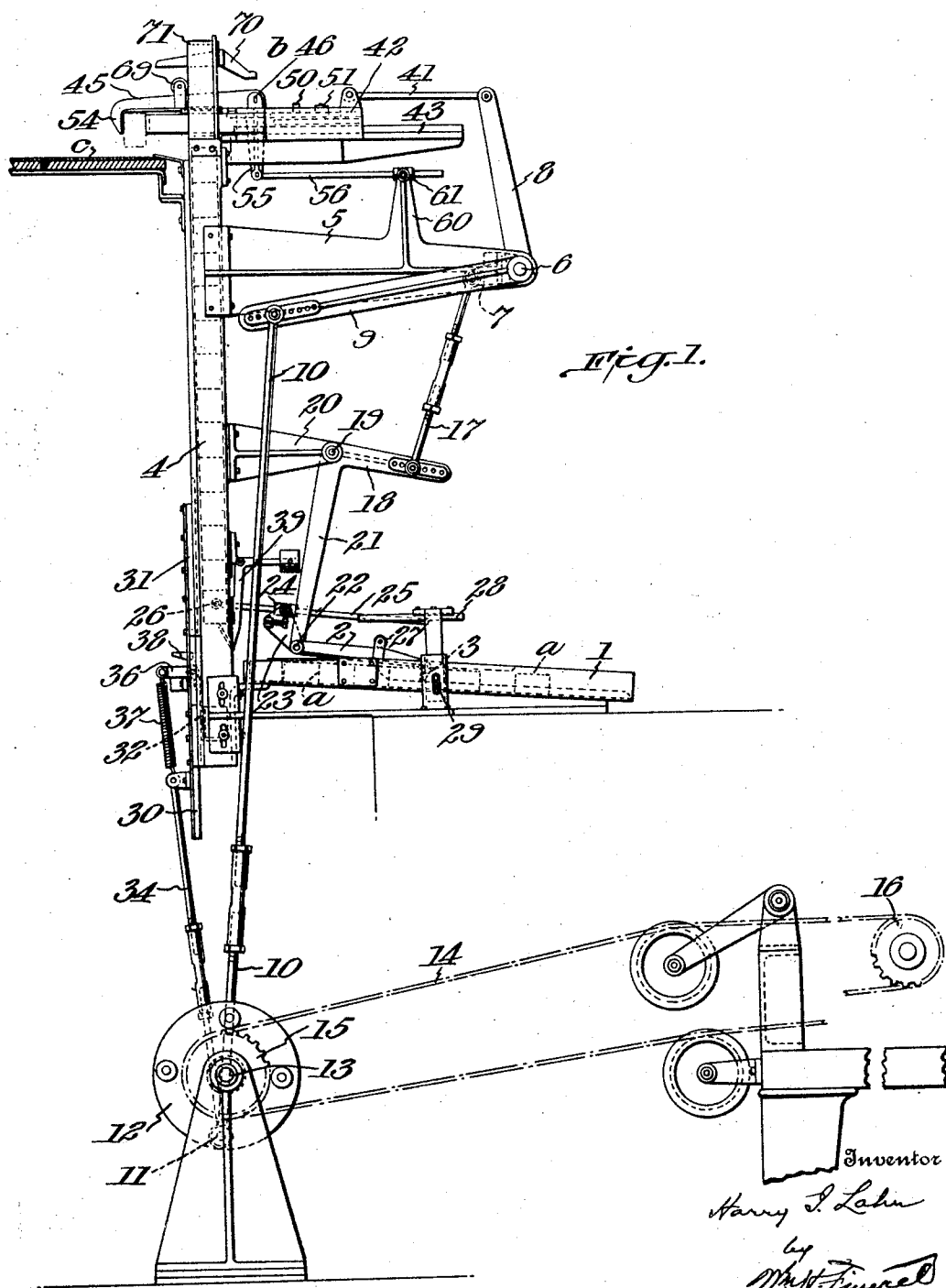
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H. I. LAHR

ELEVATOR MECHANISM FOR CONVEYERS

Filed Feb. 2, 1925

5 Sheets-Sheet 1



Oct. 16, 1928.

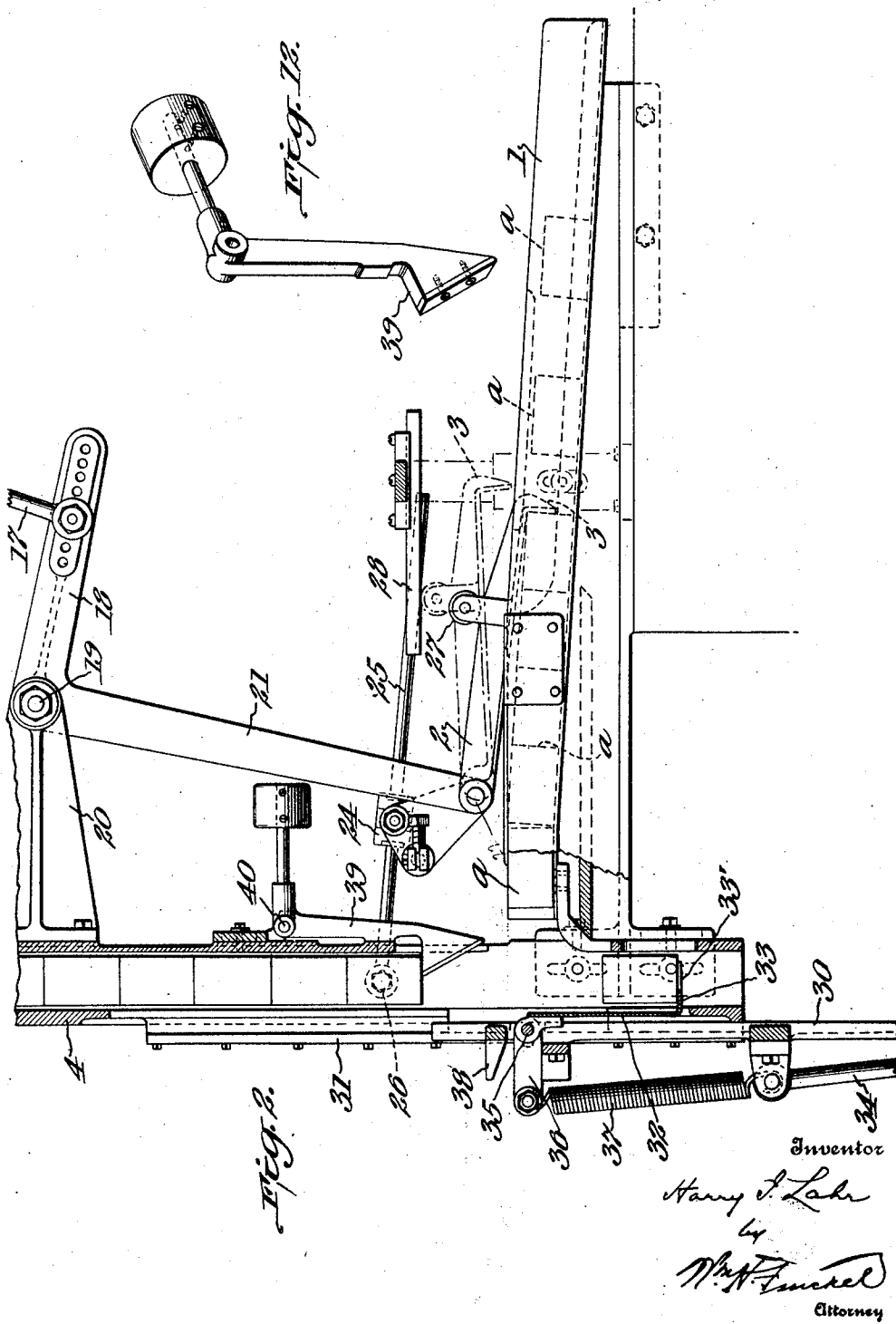
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ELEVATOR MECHANISM FOR CONVEYERS

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5 Sheets-Sheet 2



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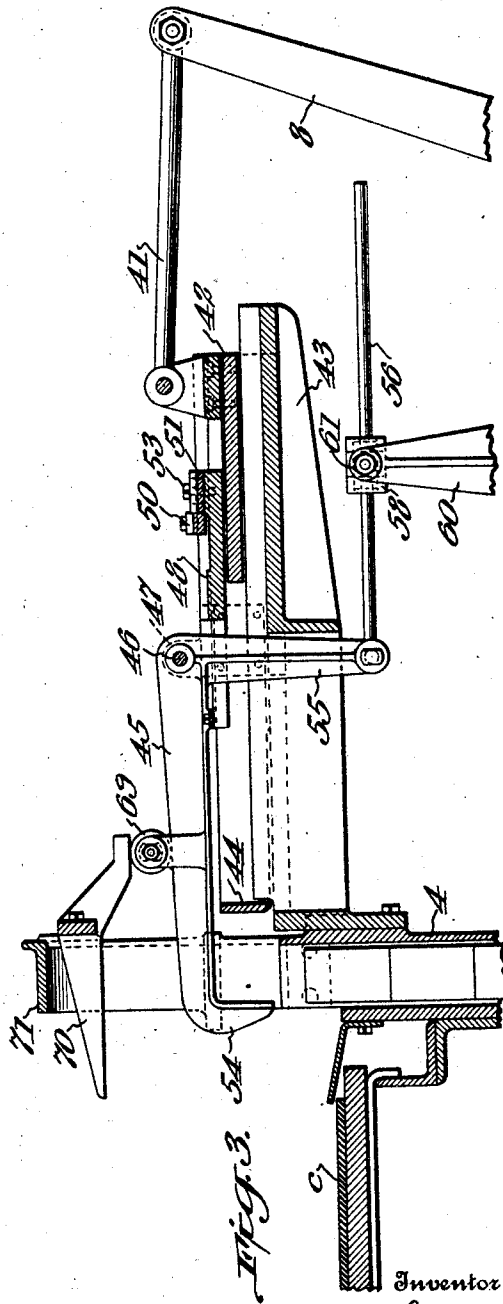
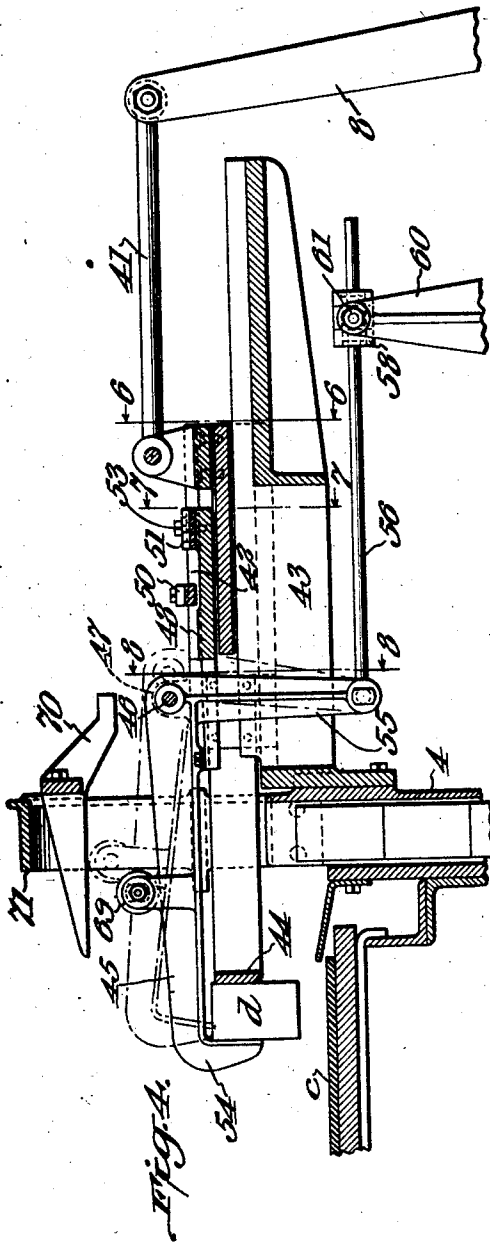
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ELEVATOR MECHANISM FOR CONVEYERS

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5 Sheets-Sheet 3



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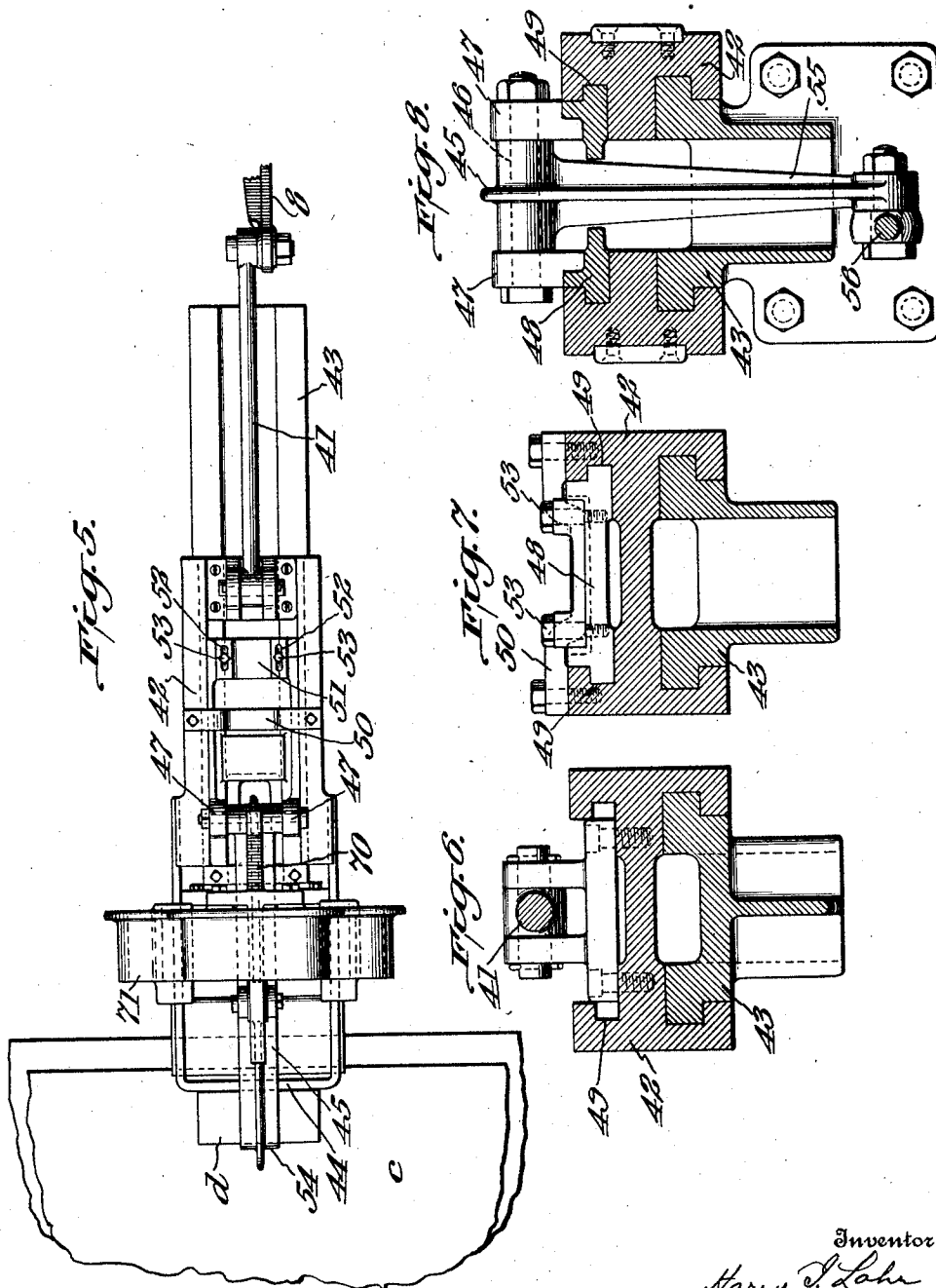
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ELEVATOR MECHANISM FOR CONVEYERS

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5 Sheets-Sheet 4



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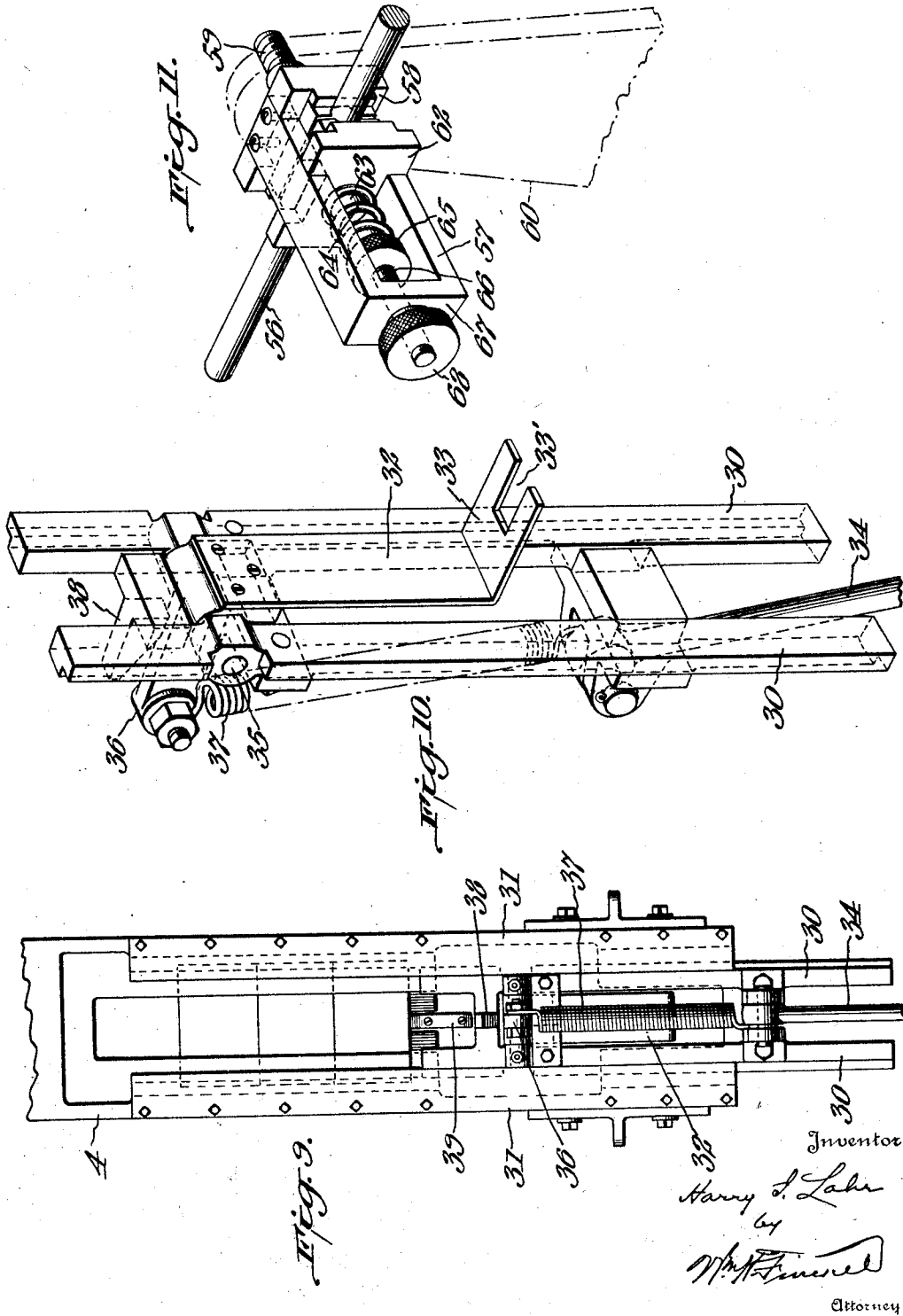
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ELEVATOR MECHANISM FOR CONVEYERS

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5 Sheets-Sheet 5



UNITED STATES PATENT OFFICE.

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ELEVATOR MECHANISM FOR CONVEYERS.

Application filed February 2, 1925. Serial No. 6,434.

This invention relates to an elevator mechanism, or elevating and transferring device, for use particularly in connection with conveyor mechanisms for match machines, of the type shown in the copending application of Harry I. Lahr and Orlo E. Swartz, filed November 8, 1924, Serial No. 748,758, patented August 21, 1928, No. 1,681,863, but it will be apparent that the device of the invention is suitable for use in various installations where it is desired to raise articles from one level to another and to transfer them from the position to which they are elevated to some point adjacent to such position.

The specific embodiment of the invention shown in the accompanying drawings and hereinafter described is an elevator mechanism for elevating boxes of matches from the level of their discharge from a match boxing machine to the level of a travelling conveyor or the like, and for picking them up box by box as they are elevated, moving them out of the elevator shaft and depositing them upon the conveyor belt or the like arranged in proximity to the shaft.

The invention consists in an elevator mechanism comprising, essentially, an elevator shaft and means associated therewith for feeding articles one by one into the shaft, means being provided in combination with the elevator shaft for raising the articles fed thereinto step by step to a predetermined height, and mechanism arranged in cooperative relation to the upper end of the elevator shaft and adapted to grasp the articles elevated in said shaft one by one, successively, and move them out of said shaft, and release them at a point outside of said shaft where they may be picked up by a travelling conveyor or otherwise handled, as I will proceed now to explain and finally claim.

In the accompanying drawings illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is a side elevation of the device of the invention, a portion of the power drive mechanism therefor, and a portion of a suitable travelling conveyor for use in connection therewith. Fig. 2 is a sectional elevation of a portion of the elevator shaft and elevator mechanism and the devices for feeding articles into the shaft. Fig. 3 is a sectional elevation of the transfer device or pick-up mechanism ar-

anged at the upper or discharge end of the shaft, and showing its parts in retracted or pick-up position. Fig. 4 is a view similar to Fig. 3, but showing the parts of the pick-up mechanism in advanced or discharging position. Fig. 5 is a plan view of the pick-up mechanism. Fig. 6 is a section taken on the line 6—6 of Fig. 4. Fig. 7 is a section taken on the line 7—7 of Fig. 4, and Fig. 8 is a section taken on the line 8—8 of Fig. 4. Fig. 9 is a front elevation of the parts shown in Fig. 2 looking toward the right. Fig. 10 is a perspective view of the reciprocating elevator mechanism for imparting the step by step elevating movement to the articles in the elevator shaft. Fig. 11 is a perspective view of the type of friction clutch member used. Fig. 12 is a perspective view of the latch member.

The articles to be elevated by the mechanism, in the specific embodiment shown, boxes of matches indicated in dotted outline at *a* (Figs. 1 and 2) are progressively moved into a chute 1 in which they are successively picked up by a pusher member 2 having a downturned end 3, and pushed thereby into a vertical elevator shaft 4 through which they are elevated to a pick-up mechanism *b* by which they may be deposited upon a travelling conveyor belt of the like *c*.

Mounted upon and carried by the elevator shaft 4 is a bracket 5 providing a bearing for a shaft 6 carrying a plurality of levers 7, 8 and 9, all rigidly attached to the shaft 6. Motion is imparted to the shaft 6 and there-through to the levers 7 and 8 through the lever 9 by means of a link 10 eccentrically connected as at 11, with a crank disk 12 mounted upon a shaft 13 and driven by chain and sprocket or other appropriate gearing 14, 15, 16 from a suitable source of power, such, in the particular embodiment of the invention shown, as the drive of a match machine proper or a match box filling and sliding machine. It will be seen that by this connection an oscillatory movement is imparted to the shaft 6 and to the levers 7 and 8 carried thereby. The lever 7 is connected by means of a link 17 with one arm 18 of a bell crank lever pivoted at 19 in a bracket 20 suitably supported, as, for example, upon the elevator shaft 4. The other arm 21 of this bell crank lever is pivotally connected at 22 with the pusher member 2 and, when oscil-

lated by means of the connection with the lever 7, will impart a reciprocatory motion to the pusher member. The pusher member 2 has rigidly connected with it a plate 23 carrying a friction clutch member 24 which embraces a rod 25 pivoted at 26 on the side of the elevator shaft 4, and the member 2 also carries a roller 27 adapted to contact with or strike against a striker-plate 28 rigidly mounted on the frame of the machine but vertically adjustable by means of slot and bolt connection 29. Mounted upon similar slides 30 carried in gibs 31 on the front of the elevator shaft 4 is an elevator plate 32 (see particularly Figs. 2, 9 and 10) vertically slidable within the elevator shaft 4 and having a box carrying portion 33. Movement is imparted to the frame formed by the slides 30 by means of a link 34 connected thereto and deriving reciprocatory movement from an eccentric connection at 11 with the disk 12, in the same manner as the link 10.

As will be seen, the elevator plate 32 is substantially L-shaped and is pivoted at its upper end upon a pivot 35 borne in sides 30 and is provided with an arm 36 connected by a tension spring 37 with the slides 30. This elevator plate is also provided with a stop member 38. A weighted latch member 39 pivoted at 40 extends into the shaft 4 at a position therein to receive boxes of matches raised by the elevator plate 32.

The lever 8 is connected by a link 41 with a slide 42 (see particularly Figs. 3 to 8) mounted upon and embracing a slideway 43 and carrying at its forward end an abutment piece 44 adapted to contact with the articles ascending the shaft 4. Also carried by the slide 42 but having a limited longitudinal movement with respect thereto is an arm 45 pivoted at 46 in bearings 47 carried by a plate 48 mounted in guides 49 in the slide 42. The plate 48 is moved forward to the position shown in Fig. 4 by its cooperation with the article indicated at *d* through the instrumentality of the pusher piece 44 rigidly carried by the slide 42 and pushing against the article *d*, and is retracted by means of a bridge piece 50 carried by the slide 42, and which cooperates with an adjustable contact member 51 carried by the plate 48 and provided with elongated bolt holes 52 through which pass bolts 53 threaded into the plate 48 and providing for its adjustment.

The outward end of the arm 45 is provided with a downturned grasping piece 54, and its inner end is provided with a lever 55 carrying a rod 56 which passes through a friction clutch member illustrated in detail in Fig. 11. This friction clutch member comprises a U-shaped frame 57 carrying at one end a fixed friction member 58 provided with a screwthreaded pivot stud or extension 59 passing through an arm 60 carried by the

bracket 5 and secured thereto by means of a nut 61. The frame 57 is also provided with an adjustable friction member 62 having a boss 63 for centering a spring 64 which abuts against a thumb nut 65 carried by an adjusting screw 66 threaded through and in screw-threaded engagement with the end member 67 of the frame 57. A lock nut 68 is provided for the outer end of the screw 66 to maintain a fixed adjustment.

It will be seen that, by this arrangement, any desired amount of pressure for producing appropriate friction upon the rod 56 may be obtained by appropriate adjustment of the screw 66.

The friction member 24 hereinbefore referred to is the same in all respects as that just described and operates in substantially the same manner.

The arm 45 is provided upon its upper surface with a roller 69 adapted to strike against a striker plate 70 rigidly carried by an arch member 71 supported by the elevator shaft 4.

The mechanism just described comprises the pick-up or transfer mechanism hereinbefore referred to.

The operation of this elevator and pick-up mechanism is substantially as follows:—As articles (for example, boxes of matches) are fed into the chute 1 from a suitable source, such, in the particular installation herein shown, as a match box filling and sliding machine, and the bell crank lever 18 is oscillated, the pusher member 2, having its downturned end 3 in position to engage behind an article, will push this article, and those ahead of it, toward the elevator shaft 4 causing the article nearest to the shaft to topple over and downward into the shaft and come to rest upon the portion 33 of the elevator plate 32. Now, the elevator plate, through its operating mechanism of crank disk 12, link 34 and slides 30, ascends to such a height that the article carried by it will be raised above the latch member 39 and will be maintained in this elevated position by engagement of the latch member with its lower surface; and, during its upward movement, will have elevated all of the articles previously fed to and already elevated in the shaft, a distance equal to its own height. At the same time that the pusher member and the elevator plate are actuated, the pick-up mechanism will operate to grasp the uppermost article in the shaft, move it outward, and drop it at a point adjacent to the elevator shaft, for example, upon the conveyer *c*.

Going now more into detail in the mode of operation of these various mechanisms, it will be seen that as the pusher member 2 moves the articles toward the elevator shaft, the friction clutch member 24 will be slid along the rod 25. When, however, the return movement of the pusher member 2 takes

place, the friction clutch member 24 will, by reason of its grasp upon the rod 25, cause the pusher member to be tilted upwardly about its pivot 22, as indicated in dotted lines in Fig. 2, so that it will clear the articles directly in its path, but upon its roller 27 striking against the striker plate 28, its upward movement will be limited, and upon its next forward movement, the initial forward impulse imparted to it by the lever 21 will, by reason of the frictional engagement of the clutch member 24 upon the rod 25, cause it to move downwardly about its pivot 22 to position to advance another article, and the articles ahead of same, as its forward movement is continued.

As the elevator plate 32 ascends, it will, as above stated, carry with it the article which has been deposited upon it by the pusher member 2, and as the article thus carried is elevated past the latch member 39, it will strike the latch member and move it outwardly until it passes above it. In order that the article carried by the elevator plate 32 may pass with ease above the latch member 39, the elevator plate is pivoted at 35, as above described, and is normally spring-pressed by the spring 37 into the position shown in Figs. 1, 2 and 10, but is capable of movement upon its pivot 35 so that a part of the movement necessary for the article to travel upwardly past the latch member may be taken up by the elevator plate, and a part of it by the latch member 39. Also, if, through any misalignment of the latch member 39 or of the elevator plate, it should happen that the notch 33' is out of alinement with the latch member, no disruption of the mechanism will occur upon the downward movement of the elevator plate, but, on the contrary, by turning upon its pivot 35 during its descent, it will be able to clear the latch member 39 without jamming. Movement of the elevator plate 32 upon its pivot 35 is limited by the cooperation of the lever 36 with the stop 38.

As hereinbefore indicated, each article elevated in the shaft 4 by means of the elevator plate 32, causes those articles already in the shaft above it, to be raised a height equal to the height of the article, thus bringing the article uppermost in the shaft into position to be grasped by the pick-up mechanism *b* and deposited thereby as hereinbefore indicated and now explained in detail.

The operation of the pick-up mechanism is as follows:—The slide 42 in the forward movement of its reciprocation, as imparted by means of the link 41 and lever 8, will cause its abutment member 44 to strike against the topmost article in the shaft 4 and will push this article against the grasping piece 54 of the arm 45, the arm 45 being meanwhile held against movement by means of its connection through the rod 56 with the friction clutch

device 61. The lost motion connection hereinabove described, and comprising the plate 48 sliding in guides 49 in the slide 42 and having its sliding movement limited by the bridge piece 50 and contact member 51 permits this relative movement, and the friction device 61 is sufficiently strong in its grip upon the rod 56 to provide an appreciable grasping pressure between the parts 44 and 54. This grasping pressure is sufficient to permit of the article being gripped and transferred from the elevator shaft to a position approximately as shown in Figs. 1, 4 and 5 outside of the elevator shaft, and over the travelling conveyer *c*. The initial portion of the return movement of the lever 8 will first cause the abutment piece 44 to be withdrawn from contact with the article, and will thus permit the article to drop from between it and the part 54, the arm 45 being held stationary meanwhile by means of the co-operation of the rod 56 with the friction clutch member 61. The continued return movement of the lever 8 will cause the lost motion between the slide 42 and the plate 48 to be taken up, the bridge piece 50 striking against the contact member 51, thus causing the plate 48 to be moved backward along with the slide 42. During this retraction of the plate 48, it will be obvious that the friction clutch member 61, at all times exerting a retarding influence upon the movement of the rod 56, will prevent movement through it of the rod 56 and will cause the lever 55 and arm 45 to turn upon pivot 46, thereby raising the arm 45 about the pivot 46 until the roller 69 strikes against the striker plate 70 so as to clear articles deposited upon the conveyer belt *c*. The continued return of the slide member 42, and with it of the arm 45, will force the rod 56 to slide through the friction clutch member 61, the roller 69 meanwhile riding along under surface of the striker plate 70 and being finally cammed down to its initial operative position as shown in Fig. 3.

Obviously this operation will be continuous so long as the machine is operated, and articles are fed into the elevator shaft through the chute 1 by means of the pusher member 2, and it will be seen that, because of the arrangement of these various moving parts from the same source (the crank disk 12) and the interconnection of the various linkages and levers by which they are operated therefrom, the pusher member 2, elevator plate 32, and pick-up mechanism *b* will be actuated in timed relation to each other so as to produce a uniform cycle of operations in the handling of the articles.

It will thus be apparent that I provide a mechanism well suited to the purpose for which it is designed, and eminently capable of handling a great many articles in uniform order, no matter how rapidly they may be presented to it.

Various changes in details of construction and arrangement of parts are contemplated as within the spirit of the invention and the scope of the following claims.

5 What I claim is:—

1. In an elevator mechanism for conveyers, an elevator shaft, means for introducing articles into said shaft, means associated with said shaft for imparting a step by step elevating movement to said articles, and means arranged in operative relation to said shaft for grasping said articles one by one as they are elevated and transferring them from said shaft to a position outside thereof and adjacent thereto and then releasing them.

2. In an elevator mechanism for conveyers, an elevator having an inlet opening and a discharge opening, means arranged adjacent to said inlet opening for introducing articles into said shaft, means associated with said shaft for imparting a step-by-step elevating movement to said articles, and means arranged in operative relation to said discharge opening for grasping said articles one by one as they are elevated and transferring them from said shaft to a position outside thereof and adjacent thereto and then releasing them.

3. In an elevator mechanism for conveyers, an elevator shaft having an inlet opening and a discharge opening, a guide chute arranged adjacent to said inlet opening and through which articles are fed one by one to said shaft, means associated with said shaft for imparting a step by step elevating movement to the articles fed thereto, and means arranged in operative relation to said discharge opening for grasping said articles one by one as they are elevated and transferring them from said shaft to a position outside thereof and adjacent thereto and then releasing them.

4. In an elevator mechanism for conveyers, an elevator shaft having an inlet opening and a discharge opening, a guide chute communicating with said inlet opening and adapted to receive articles in regular order, feed means associated with said chute for intermittently feeding said articles one by one into said shaft through said inlet opening, vertically reciprocating means arranged in said shaft for imparting a step by step elevating movement to the articles fed thereto, means for imparting reciprocatory movement to said reciprocating means in timed relation to the movement of said feeding means, pick-up means arranged in operative relation to said discharge opening for grasping said articles one by one as they are elevated and transferring them from said shaft to a position outside thereof and then releasing them, and means for imparting reciprocatory movement to said pick-up means in timed relation to the operation of said feeding means and said elevating means.

5. In an elevator mechanism for conveyers, a vertically arranged elevator shaft having an inlet opening adjacent to its bottom and a discharge opening adjacent to its top, a guide chute communicating with said inlet opening and adapted to receive articles in regular order, feed means associated with said chute for feeding said articles one by one into said shaft through said inlet opening and including a reciprocating pusher member, means arranged in said shaft for imparting a step by step elevating movement to the articles fed thereto through said inlet opening, a pick-up mechanism arranged in operative relation to said discharge opening and adapted to pick up said articles one by one as they are elevated and discharge them from said shaft and including a reciprocating grasping mechanism, and means for imparting reciprocation to said feed means, elevating means and pick-up mechanism in timed relation to each other.

6. In an elevator mechanism for conveyers, an elevator shaft having an inlet opening and a discharge opening, means for feeding articles into said shaft through said inlet opening, means associated with said shaft for imparting a step by step elevating movement to said articles, and pick-up means arranged in operative relation to said discharge opening and including a reciprocating member adapted to engage with one portion of an article and a grasping member carried by said reciprocating member and arranged in conjunction with said engaging member to grasp an opposite portion of said article to move the same out of said shaft.

7. In an elevator mechanism for conveyers, an elevator shaft having an inlet opening and a discharge opening, means for feeding articles into said shaft through said inlet opening, means associated with said shaft for imparting a step by step elevating movement to said articles, and pick-up means arranged in operative relation to said discharge opening and including a reciprocating member adapted to engage with one portion of an article and a grasping member carried by said reciprocating member and arranged in conjunction with said engaging member to grasp an opposite portion of said article to move the same out of said shaft and then release it.

8. In an elevator mechanism for conveyers, an elevator shaft having an inlet opening and a discharge opening, means for feeding articles into said shaft through said inlet opening, means for elevating said articles step by step in said shaft, and pick-up mechanism arranged in operative relation to said discharge opening and comprising a reciprocable member carrying means for grasping an article upon its opposite sides for the purpose of discharging it from said shaft.

9. In an elevator mechanism for convey-

ers, an elevator shaft having an inlet opening and a discharge opening, means for feeding articles into said shaft through said inlet opening, means for elevating said articles step by step in said shaft, and pick-up mechanism arranged in operative relation to said discharge opening and comprising a reciprocable member carrying means for grasping an article upon one of its sides, a grasping member carried by said reciprocable member and capable of a limited reciprocable movement with relation thereto for grasping said article upon its opposite side, and means for imparting reciprocation to said reciprocable member in timed relation to the operation of said feeding means and said elevating means.

10. In an elevator mechanism for conveyers, an elevator shaft having an inlet opening and a discharge opening, means for feeding articles into said shaft through said inlet opening means for elevating said articles step by step in said shaft, and pick-up mechanism arranged in operative relation to said discharge opening and comprising a reciprocable member carrying means for grasping an article upon one of its sides, a pivoted grasping member carried by said reciprocable member and capable of a limited reciprocable movement with relation thereto for grasping said article upon its opposite side, means for imparting reciprocation to said reciprocable member, and means for imparting movement to said grasping member about its pivot in response to the reciprocation of said reciprocable member.

11. In an elevator mechanism for conveyers, an elevator shaft having an inlet opening and a discharge opening, means for feeding articles into said shaft through said inlet opening, means for elevating said articles step by step in said shaft, and pick-up mechanism arranged in operative relation to said discharge opening and comprising a reciprocable member carrying means for grasping

an article upon one of its sides, a pivoted grasping member carried by said reciprocable member and capable of a limited reciprocable movement with relation thereto for grasping said article upon its opposite side, means for imparting reciprocation to said reciprocable member, means for imparting movement to said grasping member about its pivot in response to the reciprocation of said reciprocable member, and means for limiting pivotal movement of said grasping member.

12. In an elevator mechanism for conveyers, an elevator shaft having an inlet opening and a discharge opening, means including a reciprocable pusher for feeding articles one by one into said shaft through said inlet opening, means including a reciprocable elevator member for imparting step by step elevating movement to the articles in said shaft, and means arranged in operative relation to said discharge opening for grasping and discharging said articles one by one in timed relation to their step by step elevation.

13. The combination with an elevator mechanism for conveyers, of a pick-up mechanism for discharging articles therefrom, including a reciprocating slide, a sliding member carried thereby and capable of limited reciprocating movement relatively thereto, a grasping member pivotally carried by said sliding member, a friction clutch, and means interposed between said pivoted grasping member and said friction clutch whereby said grasping member is caused to remain stationary during a portion of the movement of the slide in one direction to grasp an article, and is swung upon its pivot during a portion of the movement of the slide in the opposite direction to release said article.

In testimony whereof I have hereunto set my hand this 29th day of January, A. D. 1925.

HARRY I. LAHR.