

Oct. 12, 1943.

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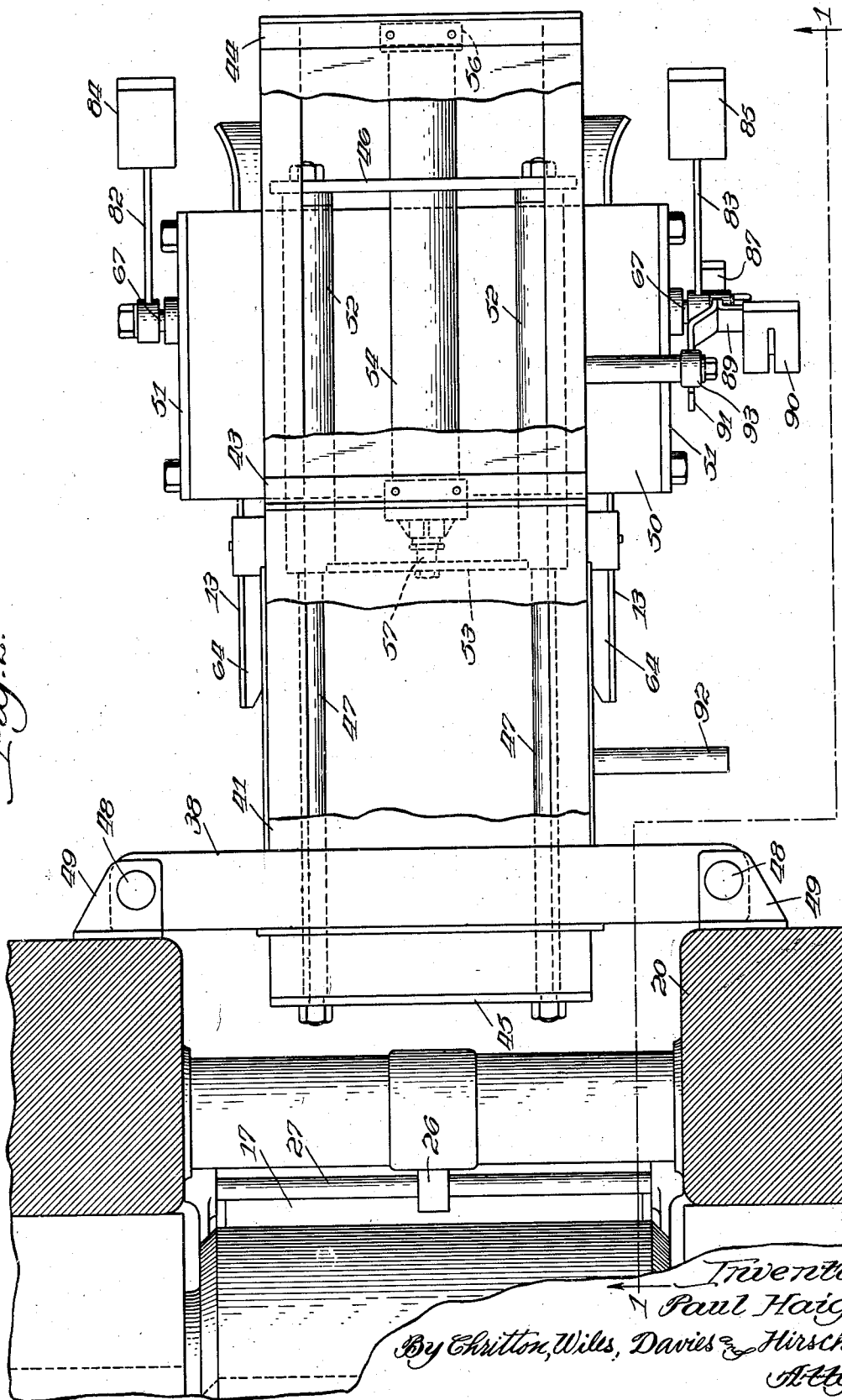
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ARTICLE-CHARGING MACHINE

Filed March 15, 1941

6 Sheets-Sheet 2

Fig. 2.



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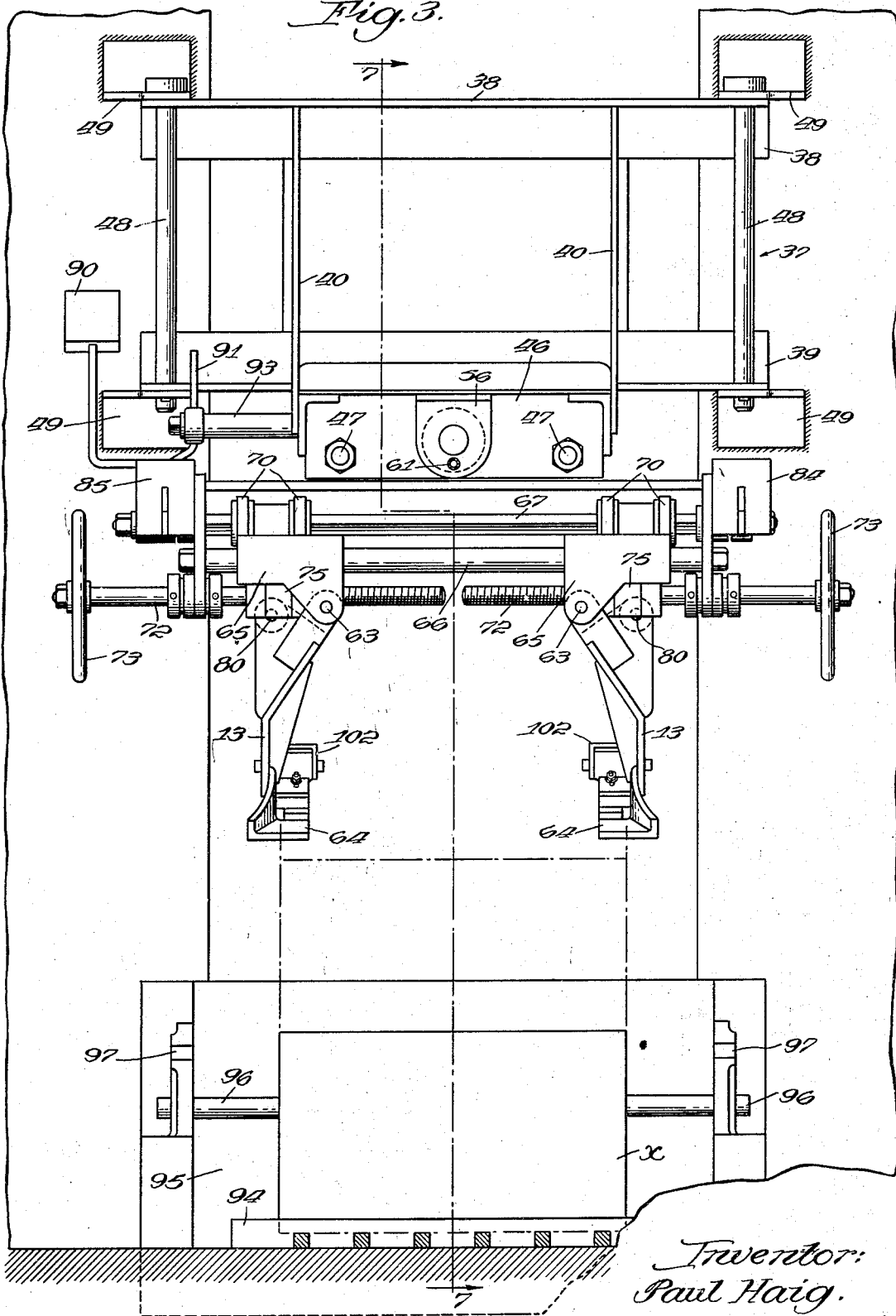
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6 Sheets-Sheet 3

Fig. 3.



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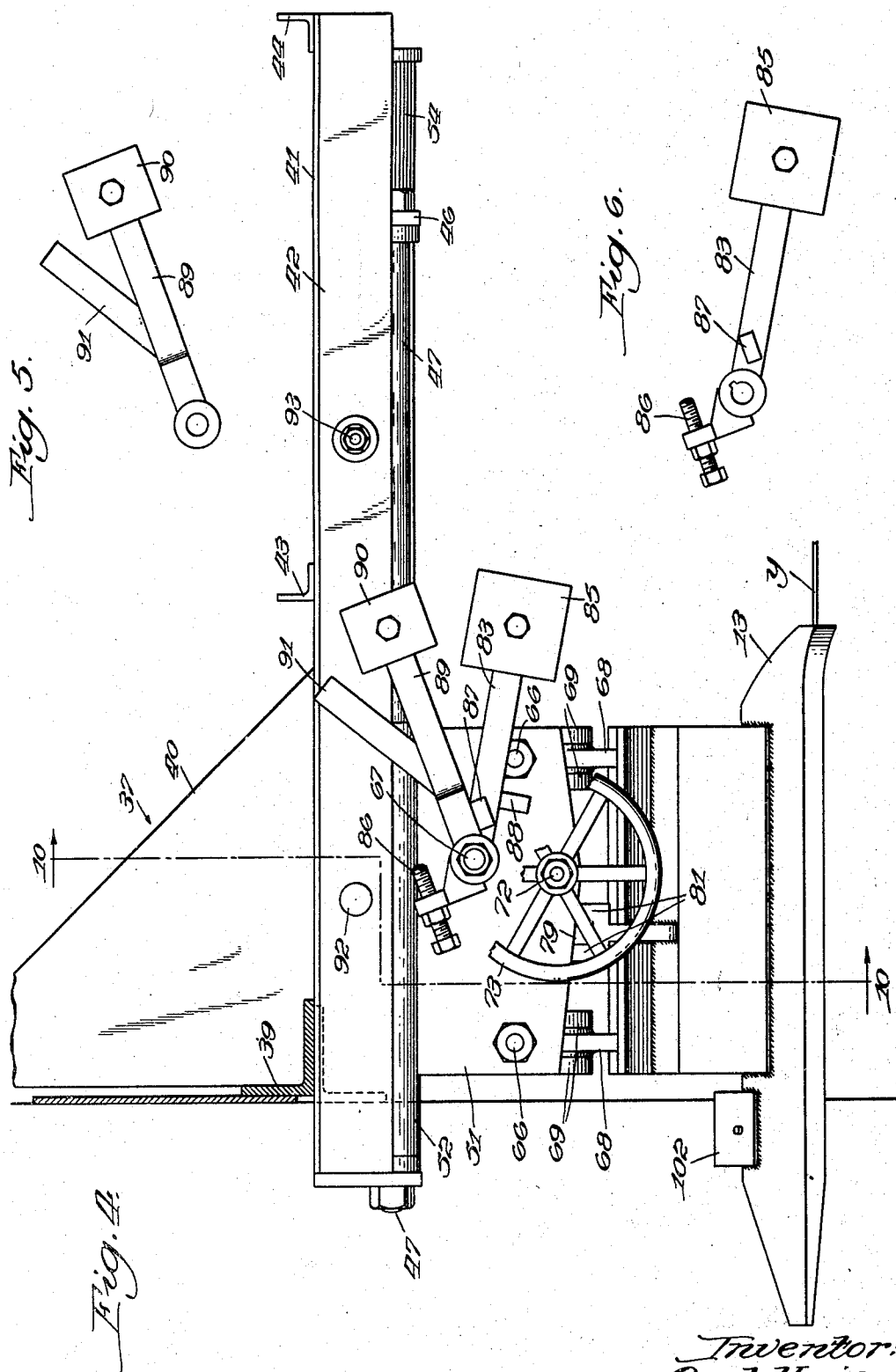
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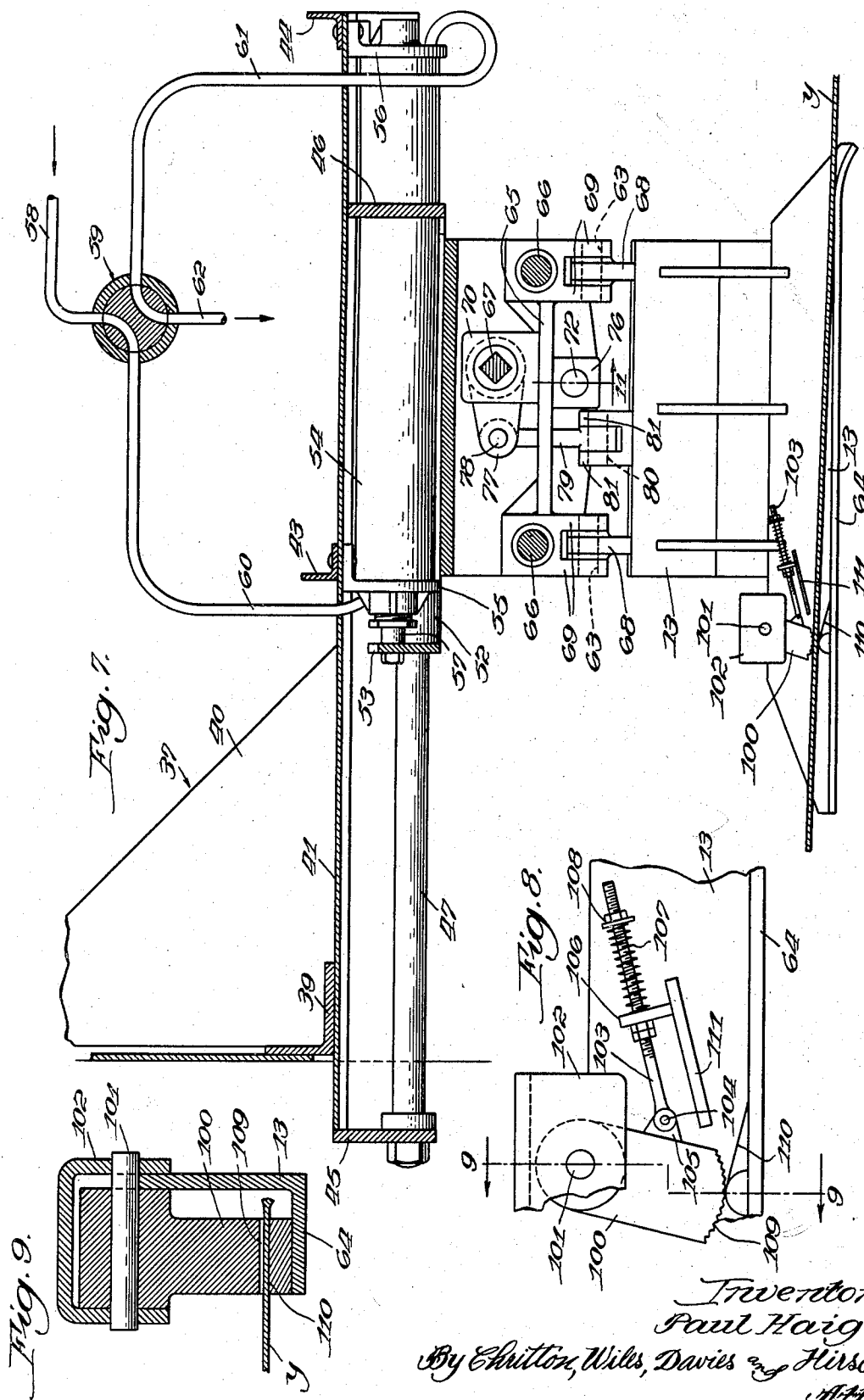
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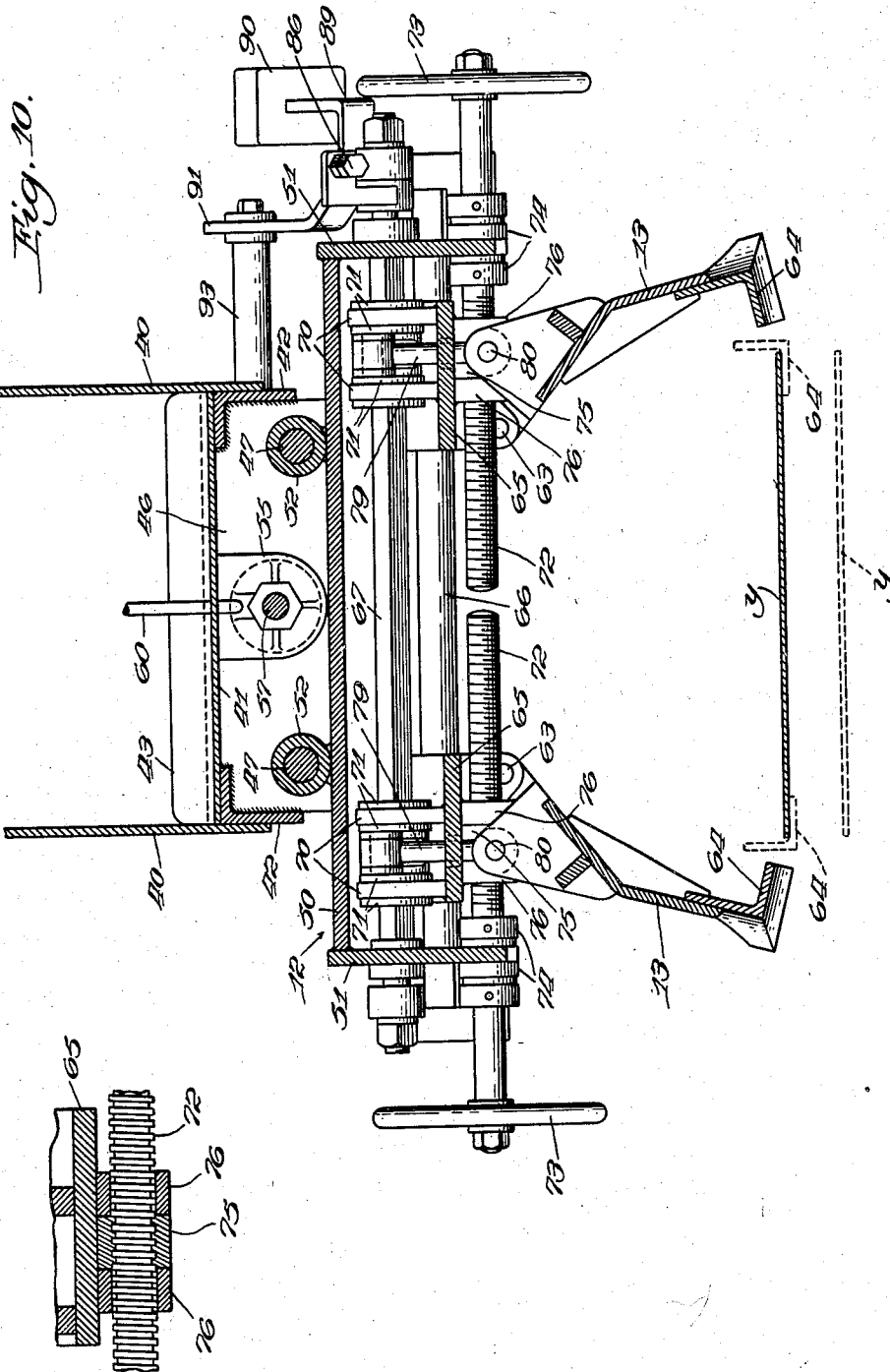
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ARTICLE-CHARGING MACHINE

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6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

2,331,392

ARTICLE-CHARGING MACHINE

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Application March 15, 1941, Serial No. 383,624

10 Claims. (Cl. 80—43)

My invention relates generally to machines for threading or charging articles to apparatus on which work is to be performed, as for example sheet or strip material particularly of metal such as steel, into continuously operating rolling apparatus such as a so-called cold mill to which the sheet or strip metal, wound in a coil, is fed for reducing it to a desired gauge.

My objects generally stated, are to provide a machine for the purpose stated whereby danger to the workmen in the threading or charging operation is reduced to the minimum; to provide a comparatively simple and positively operating machine for this purpose; to insure the proper guiding of the article to the apparatus by which work is to be performed on the article; to avoid delay in the charging of the articles to the apparatus; and other objects as will be manifest from the following description.

It may be stated as a preface to a description of my machine that the work of charging or threading the tail end of a coil of sheet or strip metal into a cold mill as commonly provided, is quite dangerous to the workmen, as the sheet or strip is apt to be more or less violently thrust laterally in one direction or the other by the action of the rolls of the cold mill upon its initial entry between them, with such force as to injure the workmen handling the sheet or strip; my machine, which was devised for use more particularly, in connection with cold mills, though not to the exclusion of its use in any other situation in which it would have utility, serving to mechanically deliver the sheet or strip to the rolls instead of feeding it thereto by hand, thus avoiding danger to the workmen; insuring the proper guiding of the sheet or strip to the cold mill; and avoiding delay in the operation of rolling successive lengths of sheets or strip.

Referring to the accompanying drawings:

Figure 1 is a view in sectional elevation of the entering end of a cold mill, showing coil-threading or charging mechanism, involving my invention, associated with a cold mill, the mechanism being shown in normal position with the tail end of a coil positioned therein ready to be advanced to the cold mill, the section being taken at the irregular line 1—1 on Fig. 2 and viewed in the direction of the arrows.

Figure 2 is an enlarged fragmentary view in plan section of the structure shown in Fig. 1, the section being taken at the line 2 on Fig. 1 and viewed in the direction of the arrow.

Figure 3 is a view in end elevation of the mechanism of Figs. 1 and 2 the structure being

viewed from the right hand side of these figures.

Figure 4 is an enlarged view like Fig. 1 of the coil-threading or charging mechanism with certain parts broken away, this view showing the positions assumed by the parts of the mechanism immediately following the entry of the tail end of the coil between, and into gripped condition with, the rolls of the cold mill at the entering end.

Figure 5 is a view in side elevation of a weighted lever device forming a part of means for controlling the supporting and releasing of the tail ends of the coils to be threaded or charged into the cold mill.

Figure 6 is a view in side elevation of one of two similar weighted lever devices also forming parts of the means referred to in the above description of Fig. 5.

Figure 7 is a sectional view taken at the irregular line 7—7 on Fig. 3 and viewed in the direction of the arrows.

Figure 8 is a fragmentary view in elevation, of means forming a part of the threading or charging mechanism for gripping the tail end of the coil.

Figure 9 is a section taken at the irregular line 9—9 on Fig. 8 and viewed in the direction of the arrows.

Figure 10 is a section taken at the irregular line 10—10 on Fig. 4 and viewed in the direction of the arrows; and

Figure 11, a fragmentary sectional view of means for adjusting the sheet or strip supporting members of the threading or charging mechanism for use with coils of different widths and into different positions in front of the cold mill.

As a preface to a detailed description of the illustrated embodiment of my invention, it may be stated that the machine shown comprises generally stated, a carrier 12 mounted at the entering end of a cold mill for movement toward and away from the mill and provided with members 13 for releasably supporting the tail end of the sheet-metal coil to be threaded into the cold mill, at the opposite longitudinal side edge-ports of the coil, the carrier 12 feeding the tail end of the coil to the cold mill; means for actuating the supporting members 13 to release the tail end of the coil; and means for restoring the supporting members 13 to a position for supporting the tail end of the next coil to be threaded into the cold mill.

In the construction shown, the roll stand at the entering end of a cold mill, and shown of the four-high roll type, is represented at 14, the

mill being shown as provided, in accordance with common practice, with wiper or tensioning means 15 for engaging the tail end of the coil of sheet or strip metal, to be threaded, or charged, into the cold mill between its rolls 14a. The wiper means shown and of a well known construction comprises a stationary guide 16 extending lengthwise, and in front of, the roll stand 14 and across the full width of the sheet or strip to be threaded or charged into the cold mill; a bar 17 located directly above, and parallel with, the guide 16 and of the same length as this guide, and means for moving the bar 17 toward and away from the guide 16 to exert the desired degree of clamping pressure against the sheet or strip positioned between the guide 16 and bar 17, to produce the desired tension on the sheet or strip, or to relatively separate these parts to permit of the insertion of the strip or sheet to position in the wiper mechanism; the upper face of the guide 16 and the under surface of the bar 17 being surfaced with any suitable material, as represented at 18 and 19, respectively, as for example wood. The bar 17 is supported by links pivoted at their lower ends to the ends of the bar 17 and at their upper ends to brackets secured to the inner sides of the frame 20 of the roll stand 14, one of the links and brackets being shown at 22 and 23, respectively, and the pivotal connections of this link at 24 and 25; the support for the bar 17 also comprising a link 26 located midway between the ends of the bar 17 and pivoted on a rod 27 connecting the brackets 23 together, the link 26 being pivoted at 28 to an arm 29 on the bar 17. The link 26 is pivotally connected at 30 with the lower end of the piston-stem 31 of a fluid pressure operated piston and cylinder mechanism 32 having any suitable means for controlling the forcing of its piston in either direction as desired in accordance with common practice, for moving the bar 17 into and out of operative position. The mechanism 32 is pivotally connected at the upper end of its cylinder 33 as indicated at 34 to a plate 35 mounted on a rod 36 supported on the frame 20.

The carrier 12 is mounted on a supporting frame 37 rigidly secured to the frame 20 of the roll stand 14, the frame 37 comprising a pair of upper and lower horizontal parallel angle irons 38 and 39, respectively, extending crosswise of the machine and connected together by parallel vertical plates 40 extending crosswise of, and below, the angle-irons 38 and 39; a horizontal plate 41 below the angle-iron 39 between the lower ends of the plates 40; spaced apart parallel angle-irons 42 extending lengthwise of the machine and located at the underside of the plate 41 between the lower ends of the plates 40 (Fig. 10); the plates 40 and 41 and the angle-irons 38, 39 and 42 being rigidly secured together with bracing angle-irons 43 and 44 secured to the plate 41; plates 45 and 46 extending crosswise of the angle-irons 42 and rigidly secured thereto at the forward end of the supporting frame and adjacent its rear end, respectively, and parallel guide rods 47 extending lengthwise of the machine and rigidly connected at their ends with the plates 45 and 46.

The frame 37 is shown as supported on the frame 20 of the cold mill at its entering end by vertical pins 48 extending through the ends of the angle irons 38 and 39 and through angle clips 49 secured to the cold-mill frame 20. Preferably at least one of the pins 48 is removable

to adapt the supporting frame 37 to be swung, if desired, horizontally to one side of the cold mill.

The carrier 12 comprises an inverted channel member having a top plate portion 50 and depending side plate portions 51, and parallel sleeve 52 rigidly secured to the top of the plate 50 and surrounding, and slidable along, the guide rods 47. The sleeves 52 are connected together at their forward ends by a plate 53 to which means for reciprocating the carrier 12 are connected, these means being shown as in the form of a fluid-pressure-operated piston and cylinder mechanism carried by the supporting frame 37, the cylinder of this mechanism and represented at 54 being secured to the supporting frame 37 by the cylinder ends 55 and 56, and the piston stem thereof, which is connected with the plate 53, being represented at 57. Valve means for controlling the admission to the ends of the cylinder 54, alternately, of actuating fluid pressure supplied from any suitable source through a pipe 58, and for venting the cylinder of spent fluid pressure, are represented diagrammatically at 59. The valve means shown are of the well known two-way-valve type with pipe-connections 60 and 61 to the opposite ends of the cylinder 54 and pipe connection 62 to exhaust.

The members 13 for releasably supporting the sheet or strip to be delivered to the cold mill and which extend lengthwise of the machine are pivotally supported at their upper portions as indicated at 63, to swing at their lower edge portions, provided with inwardly directed flanges 64 upon which the sheet or strip is supported, in a direction crosswise of the machine into and out of the full line and dotted line positions shown in Fig. 10.

The pivots 63 on which the members 13 swing are shown as provided on heads 65 slidable crosswise of the machine on a pair of parallel rods 66 and on an intermediate square shaft 67, mounted in the side plates 51 of the carrier 12, the shaft 67 being journaled in these plates.

The pivotal connections 63 of the members 13 with the heads 65, are provided between upwardly extending ears 68 on the members 13 and depending ears 69 on the heads; and the portions of the heads through which the square shaft 67 extends are formed of pairs of upwardly extending apertured ears 70, containing bushings 71 rotatable therein and having square openings to receive the shaft 67.

The heads 65 are slidable on the rods 66 and the shaft 67 to permit the sheet or strip supporting members 13 to be adjusted for sheets or strips of different widths and into any desired position in front of the rolls of the cold mill; such adjustment being effected by means of a pair of screws 72, having hand wheels 73 rigid therewith, journaled in the side plates 51, but held against longitudinal movement by collars 74 on these screws, and having threaded engagement with square nuts 75 held stationary by the heads 65 and confined between depending pairs of ears 76 on these heads.

The means controlling the position of the sheet or strip supporting members 13 comprise arms 77 on the square shaft 67 between the ears 70 of each pair thereof and rotatable with this shaft, the outer ends of the arms 77 being loosely pivotally connected at 78 with the upper ends of links 79 loosely pivotally connected at their lower ends, as indicated at 80, to the supporting members 13 at spaced apart ears 81 thereon. Thus rocking

the square shaft 67 swings the supporting members 13 inwardly or outwardly at their lower ends depending on the direction in which this shaft is rotated.

The controlling means now being described also comprise levers 82 and 83 keyed on the ends of the square shaft 67 having balancing weights as indicated at 84 and 85, respectively. The lever 83 is provided with stops 86 and 87 at opposite sides of the shaft 67, the stop 86 being shown as in the form of a screw, thus rendering it adjustable. A stop 88 on one of the side plates 51 of the carrier 12 serves, in conjunction with the lever 83, to limit clockwise turning of the shaft 67 in Fig. 5 in which turning movement the sheet or strip supporting members 13 are swung outwardly to sheet or strip releasing position as shown in full lines in Fig. 10.

Cooperating with the lever 83 is what may be termed a flying weight shown as in the form of a lever 89 rotatable on the shaft 67 and having a weight 90 at its outer end. The lever 89 which cooperates with the stops 86 and 87 alternately, is provided with an upwardly inclined arm 91 adapted in the reciprocations of the carrier 12 to alternately engage stops 92 and 93 on the stationary supporting frame 37 for throwing the lever 89 first in one direction and then in the other to oscillate the square shaft 67 by alternately engaging the stops 87 and 86 on the lever 83 and thus swing the sheet or strip supporting members 13 out of sheet or strip supporting position in the movement of the carrier 12 toward the cold mill, and into such supporting position in the movement of the carrier away from the cold mill.

Fig. 1 illustrates the mill in the process of rolling a sheet or strip from a coil X, shown in dotted lines, the greater portion of which has already passed through the mill, and shows the next succeeding coil Y from which the leading end of the sheet or strip, is to be threaded or charged into the cold mill, by the threading or charging mechanism in which the leading end of the coil Y is positioned ready for the operation of the mechanism to effect the threading or charging operation.

In such condition of the apparatus the coil X from which the sheet or strip is passing through the mill, is supported at its periphery on rollers 94 in a well 95 and is held against riding off these rollers by a bar 96 dropped into slots in the side walls of the well 95, one such slot being shown at 97, and extending through the opening in the coil X. The succeeding coil Y is rolled up to a stop shoulder 98 which prevents this coil from rubbing against the coil ahead of it, but over which stop shoulder the coil rides when pull is exerted on the sheet or strip of this coil, by the cold mill, the dotted representation Z of a coil in Fig. 1 representing a coil which has been pulled over the stop shoulder 98 to the rollers 94 by the action of the cold mill.

The leading end of the sheet or strip of the succeeding coil Y, while the one ahead of it is being passed through the cold mill, is partially unwound from the coil as shown and introduced into the carrier 12 to rest at its lateral edges on the supporting members 13 positioned as shown by dotted lines in Fig. 10, and extend at its terminal edge close to the wiper device 15 (Fig. 1). In this position of the parts of the mechanism the carrier 12 is in its rearwardmost position in which the engagement of the arm 91 of the lever 89 with the stop 93 has rocked the lever 89 from the position shown in Fig. 4 to the

position shown in Fig. 1 in which movement this lever has engaged the stop 86 on lever 83 and rocked the shaft 67 counterclockwise, in which operation the sheet or strip supporting members 13 have been moved to sheet or strip supporting position.

As soon as the inner or trailing end of the coil X has passed beyond the roll-stand 14 the operator actuates the mechanism 32 to lift the wiper bar, and also conditions the valve 59 to admit operating fluid pressure to the rear end of the cylinder 54 and open its forward end to exhaust, whereupon the carrier 12 moves forwardly toward the cold mill, carrying the leading end of the sheet or strip through the wiper device and into the nip of the rolls 14a of the roll stand 20 whereupon the operator lowers the bar 17 to operative position.

Immediately before the carrier 12 reaches its forwardmost position the rolls 14a of the roll stand 14 grip the leading end of the sheet or strip and pull it into the mill, the arm 91 of the lever 89, in the final forward movement of the carrier 12, striking the stop 92 which throws the lever 89 over center, causing it to strike the stop 87 on lever 83 and rock the lever 83 downwardly which rotates the shaft 67 in a direction to swing the sheet or strip supporting members 13 out of supporting position, whereupon the sheet or strip drops from the carrier 12 into its natural curve below the members 13 and the sheet or strip is unwound from the coil as the cold mill continues to operate; the coil Y, under the pull of the cold mill, riding over the stop shoulder 98 and upon the rollers 94 in which position the coil-restraining rod 96 is applied to position.

During such unwinding of the coil Y the operator restores the threading or charging mechanism to normal position (Fig. 1) and positions in this mechanism the leading end of the next coil to be operated on by the cold mill.

The threading or charging mechanism is restored to normal position by the operator manipulating the valve 59 to admit operating fluid pressure to the forward end of the cylinder 54 and open its rear end to exhaust. In such movement of the carrier 12 the arm 91 on the lever 89 strikes the stop 93 thus throwing the lever 89 against the stop 86 on the lever 83 which swings the lever 83 to the position shown in Fig. 1, in which the sheet or strip supporting members 13 are in supporting position.

To positively feed the sheet or strip by the carrier 12, means for gripping the sheet or strip in the forward movement of the carrier, but releasing the grip, responsive to pull on the sheet or strip by the cold mill, are provided. The means shown for this purpose comprise dogs 100 pivoted at 101 to clips 102 secured to the sides of the sheet or strip supporting members 13 and normally spring pressed to clamp the sheet or strip to these members and drag it forwardly in the forward movement of the carrier.

The spring means shown for this purpose comprise, for each dog 100, a rod 103 pivoted at 104 to an ear 105 on the dog 100 and slidable in a lug 106 on the adjacent supporting member 13 and a coil spring 107 surrounding the rod 103 and confined between the lug 106 and a stop 108 on the rod, and tending to rock the dog 100 downwardly. The lower ends of the dogs 100 are serrated as indicated at 109 of the dog shown in Figs. 7 and 8 and the sheet or strip is clamped against inclined guides 110 which, with reverse-

ly inclined guides 111 on the supporting members

13, form throats to receive the edges of the sheet or strip, the dogs 100 being preferably set in from the longitudinal edges of the sheet or strip, as shown of the one dog in Fig. 9, to avoid clamping the sheet or strip at its edges which sometimes are rough and if so prevent the proper grip on the sheet or strip.

As will be understood, the pull exerted by the rolls of the mill, on the sheet or strip automatically releases the grip of the dogs 100 on the sheet or strip and thus the dogs do not interfere with the swinging of the supporting members 13 out of supporting position in the forward movement of the carrier 12.

While I have illustrated and described a particular construction embodying my invention I do not wish to be understood as intending to limit it thereto as the same may be variously modified and altered and the invention embodied in other forms of structure without departing from the spirit of my invention, it being my intention to claim my invention as fully and completely as the prior state of the art will permit; and in this connection, it may be stated that while I have illustrated and described my invention as applied to the threading or charging of sheet or strip coiled material to a cold mill, I do not wish to be understood as intending to limit it thereto as it is my intention to cover the invention for any and all uses to which it may be put.

What I claim as new and desire to secure by Letters Patent, is:

1. A machine of the character set forth, comprising a movable carrier having means for supporting an article to be fed, said means comprising movably supported article-supporting members adapted to move crosswise of the machine in the direction of the width of the article into and out of article-supporting position, a shaft journaled on said carrier, connections between said members and shaft for actuating said members upon rotating said shaft, and means for rotating said shaft comprising stops relative to which said carrier moves and a member movable on said carrier and cooperating with said stops and operating, when said carrier is moved in one direction to engage one of said stops and rotate said shaft in one direction and when said carrier is moved in the other direction to engage the other of said stops and rotate said shaft in the opposite direction.

2. A machine of the character set forth, comprising a movable carrier having means for supporting an article to be fed, said means comprising movably supported article-supporting members adapted to move crosswise of the machine in the direction of the width of the article into and out of article-supporting position, a shaft journaled on said carrier, connections between said members and shaft for actuating said members upon rotating said shaft, and means for rotating said shaft comprising stops relative to which said carrier moves and a lever movable on said carrier to opposite sides of a vertical position and cooperating with said stops and operating upon engaging one of said stops to swing in one direction beyond vertical position and rotate said shaft in one direction and upon engaging the other of said stops to swing in the opposite direction beyond vertical position and rotate said shaft in the other direction.

3. A machine of the character set forth, comprising a movable carrier having means for supporting an article to be fed, said means comprising movably supported article-supporting

members adapted to move crosswise of the machine in the direction of the width of the article into and out of article-supporting position, a shaft journaled on said carrier, connections between said members and shaft for actuating said members upon rotating said shaft, and means for rotating said shaft comprising a stop relative to which said carrier moves, a lever rotatable with said shaft and having a stop, and a member movable on said carrier and cooperating with said stops and operating upon engaging said first-named stop to engage said second-named stop and swing said lever for rotating said shaft.

4. A machine of the character set forth, comprising a movable carrier having means for supporting an article to be fed, said means comprising movably supported article-supporting members adapted to move crosswise of the machine in the direction of the width of the article into and out of article-supporting position, a shaft journaled on said carrier, connections between said members and shaft for actuating said members upon rotating said shaft, and means for rotating said shaft comprising stops relative to which said carrier moves, a lever rotatable with said shaft and having stops, and a member movable on said carrier and cooperating with said first and second-named stops, said member in the movement of said carrier in one direction engaging one of said first-named stops and operating to engage one of said second-named stops and move said lever in a direction for actuating said shaft in one direction, and in the movement of said carrier in the other direction engaging the other of said first-named stops and operating to engage the other of said second-named stops and move said lever in a direction for rotating said shaft in the other direction.

5. A machine of the character set forth, comprising a movable carrier, means thereon for supporting an article to be fed at its opposite lateral edges, said means being movable crosswise of said carrier in the direction of the width of the article into and out of article-supporting position, and means carried by said first-named means operating in the feeding movement of said carrier to feed the article therewith, releasable, upon the exertion of force against the article, independent of that exerted by said carrier, in the direction of the feeding movement.

6. Apparatus for feeding successive articles to rolls comprising, a movable carrier; means on said carrier for supporting an end of an article in a position vertically spaced from the previously fed article with said end adjacent the rolls ready for introduction to the rolls when the previously fed article has passed through the same; means to move the carrier to feed said end to the rolls; and means to automatically release the supporting means from the article when the article is moved by the rolls.

7. A machine of the character set forth, comprising a movable carrier, a stationary support therefor, means on said carrier for supporting an article to be fed in a feeding position vertically spaced from a previously fed article while the latter is being worked, said last named means operable for movement out of article supporting position, means operating upon movement of said carrier on its feed stroke to a predetermined position, to actuate said first named means to release the article, and means comprising a stationary abutment upon the carrier-supporting means and means moving with the carrier

and movable thereon contacting with said abutment operating upon movement of the carrier on its return stroke to return the first named means to article supporting position.

8. In a machine of the character described, a movable carrier, threaded shafts mounted on said carrier, pivot blocks having respective screw-threaded engagement with said shafts, article-supporting means pivotally supported by said blocks for swinging movement in the direction of the width of the supported article, into and out of supporting position, a non-cylindrical shaft mounted in the carrier parallel with said threaded shafts, actuating blocks slidably mounted on said non-cylindrical shaft to be oscillated thereby, connections between said actuating blocks and the respective article supporting means to cause swing of the latter when the actuating blocks are oscillated, means to cause partial rotation of said non-cylindrical shaft to move said supporting means between article supporting and releasing positions, and means to cause rotation of said threaded shafts to move said threaded and actuating blocks whereby to adjust the spacing of said supporting means for articles of different widths.

9. A machine of the character set forth comprising a movable carrier, means thereon for supporting an article to be fed, said means having a supporting surface and being movable crosswise of said carrier in the direction of the width of the article into and out of article supporting position, and means for feeding the

article by movement of said carriage comprising a clamp member for clamping the article against said supporting surface, said clamp member mounted on said first named means and movable relative to the latter and means involving the mount of said member whereby contact of an article to be fed with said member moves the latter away from said supporting surface to allow free movement of the article in a feeding direction relative to said last named means while preventing retrograde relative movement between the article and said last named means.

10. A machine of the character set forth, comprising a movable carrier, means thereon for supporting an article to be fed, said means having a supporting surface and being movable crosswise of said carrier in the direction of the width of the article into and out of article supporting position, a clamp pivoted on said support upon an axis spaced from said surface a distance less than the extension of said clamp toward said surface, and means to urge said clamp toward said surface about its pivot, said clamp and said surface lying at an angle less than 90° with the apex of the angle facing in the direction of feed of the article, whereby an article placed on the support and moved forwardly on said surface will be automatically clamped against retrograde movement and released from action of the clamp when force against the article is exerted independent of that exerted by said carrier in a direction of feed.

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