June 15, 1954 H. N. IPSEN 2,681,136

TRANSFER MECHANISM

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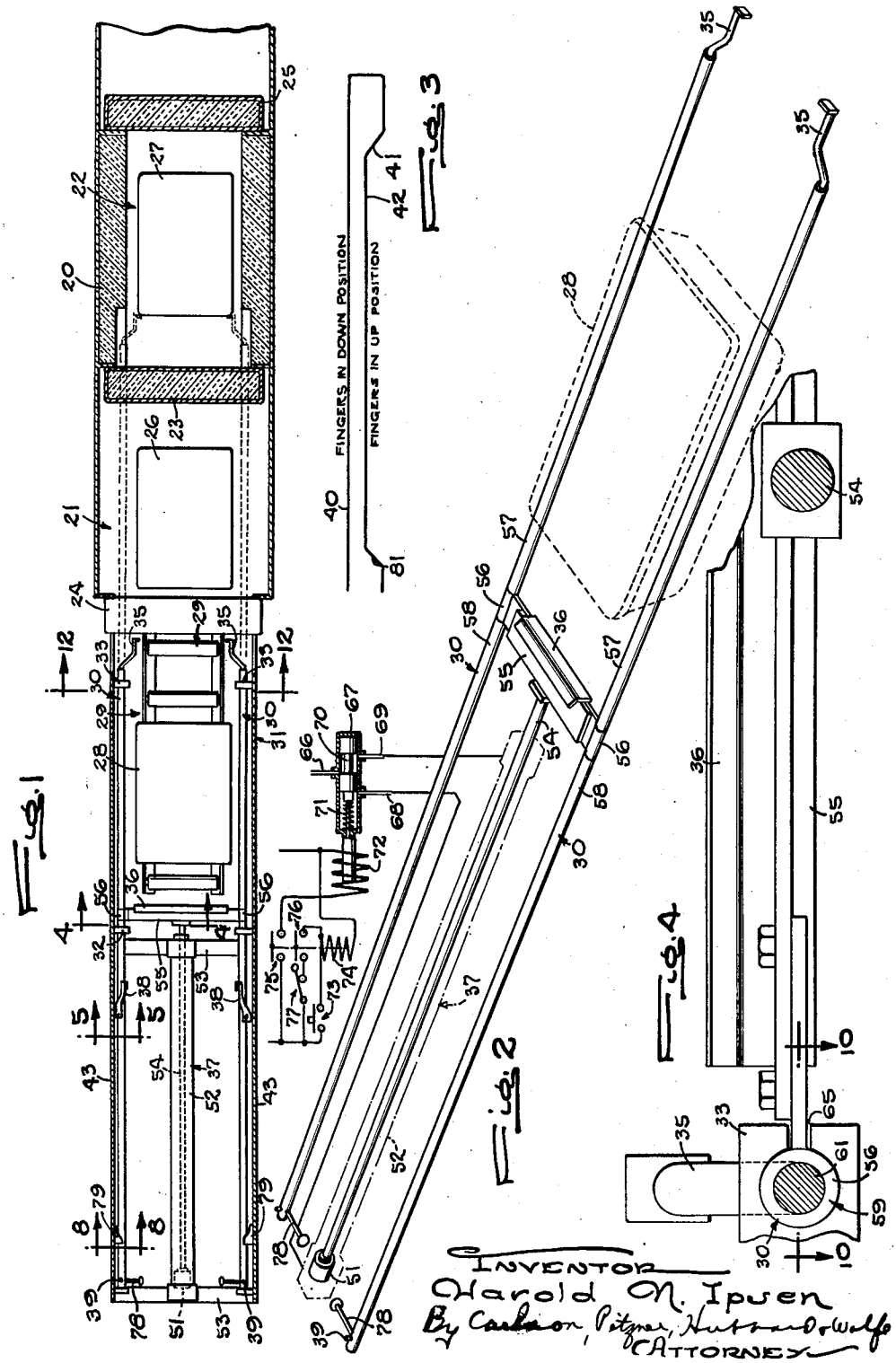


Fig. 1

Fig. 2

Fig. 3

Fig. 4

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TRANSFER MECHANISM

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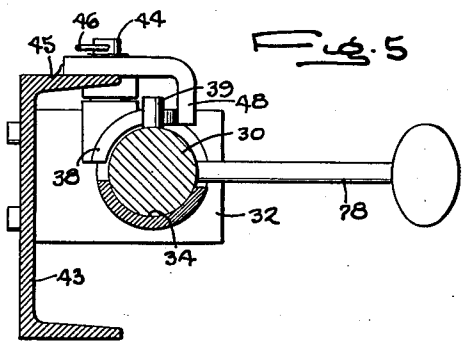


Fig. 5

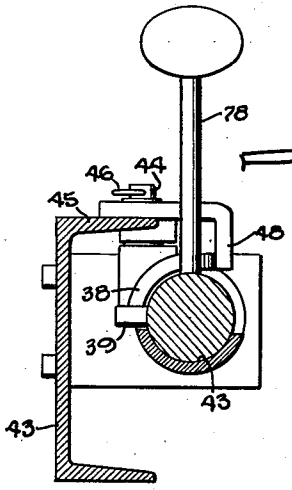
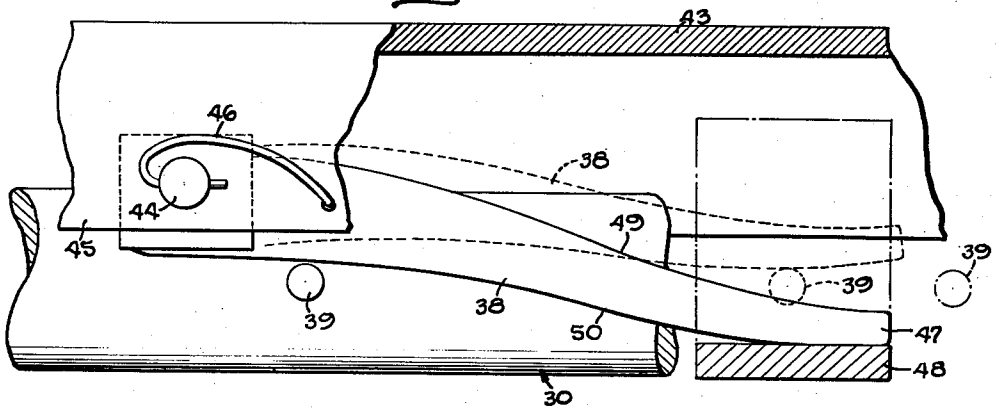


Fig. 6

Fig. 7



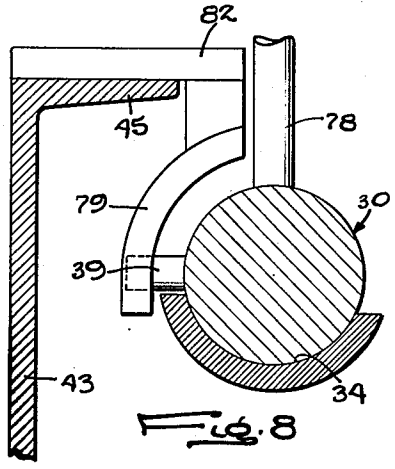


Fig. 8

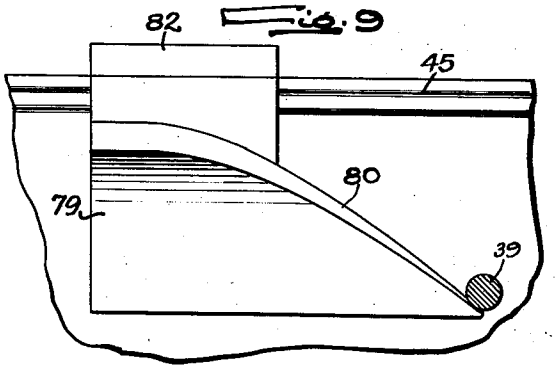


Fig. 9

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TRANSFER MECHANISM

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Fig. 10

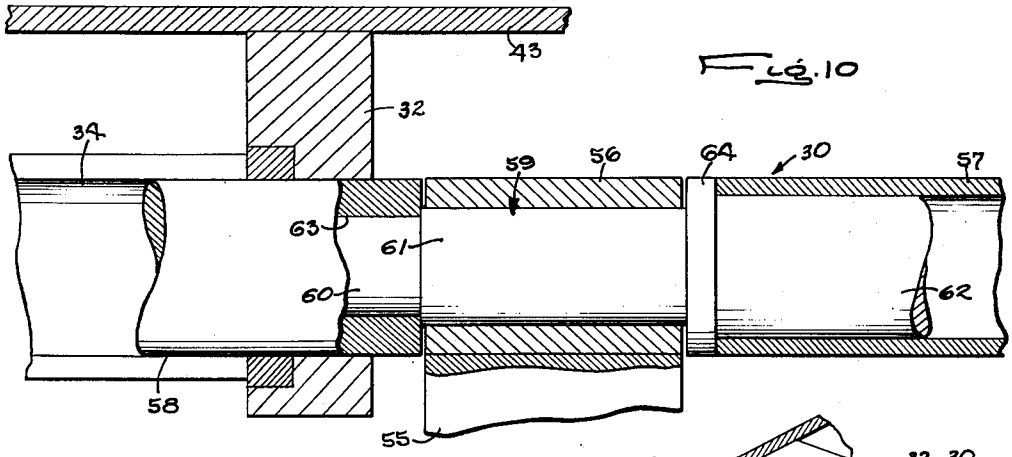


Fig. 11

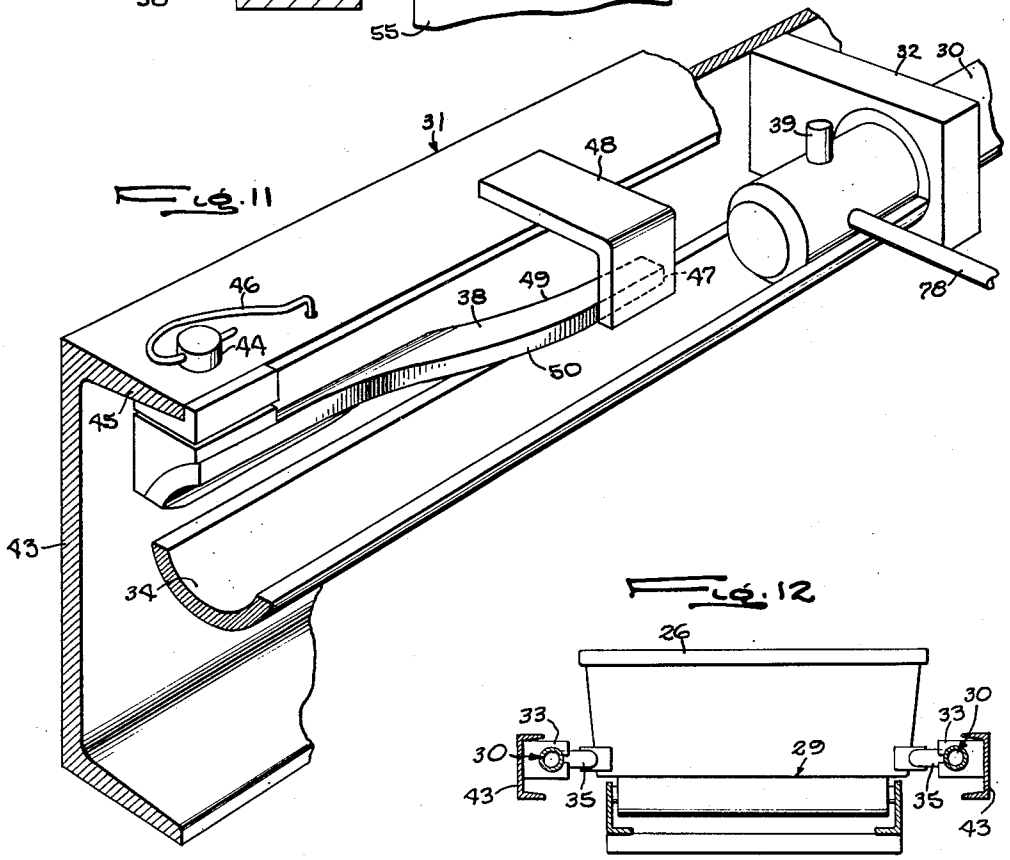


Fig. 12

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TRANSFER MECHANISM

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Fig. 13

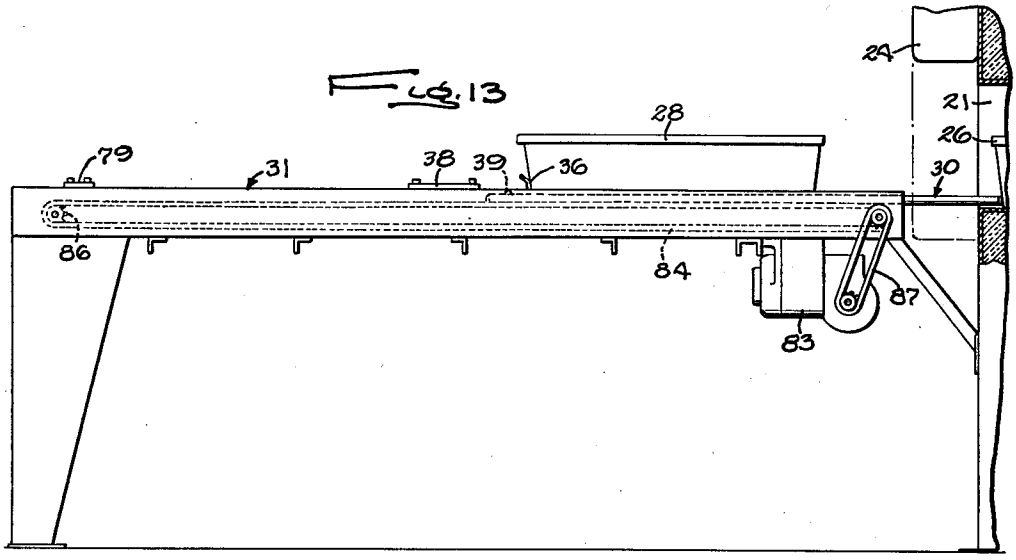


Fig. 14

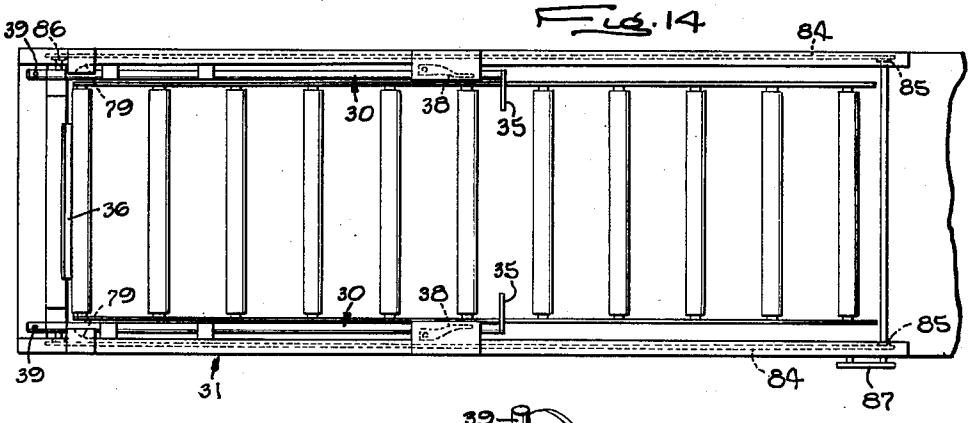
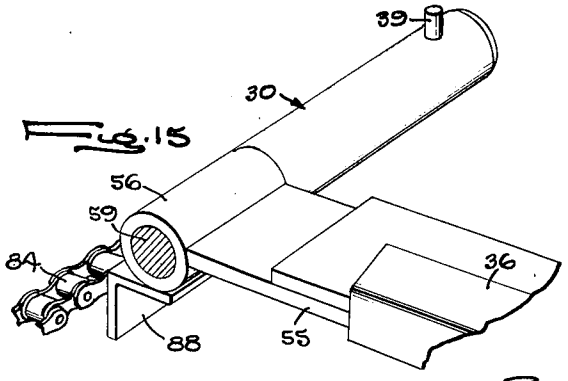


Fig. 15



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UNITED STATES PATENT OFFICE

2,681,136

TRANSFER MECHANISM

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Application July 29, 1952, Serial No. 301,501

14 Claims. (Cl. 198—221)

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This invention relates to a material handling apparatus for moving an article along a rectilinear path. More particularly, the invention relates to an apparatus of the type including a pair of elongated parallel rods mounted for turning and endwise sliding and carrying fingers which swing into and out of the path of the articles when the rods are turned back and forth and which, when disposed in the path, engage and move an article as the rods are moved endwise.

The general object is to construct a transfer apparatus of the above character in a novel manner so that a power actuator may be used to slide the rods forward and advance an article along the path and to slide the rods back to their original position without the fingers interfering with other articles in the path.

A more detailed object is to swing the fingers automatically as an incident to the endwise sliding of the rods whereby the fingers will be positioned properly simply by moving the rods back and forth.

Another object is to swing the fingers out of the path during the initial movement of the rods as they slide back to their original position after transferring an article so that, during the return of the rods, the fingers are out of the way of the other articles in the path.

A further object is to achieve the foregoing object by the use of cams which are inactive as the rods move forward and are operable to turn the rods and swing the fingers out of the path of the articles as the rods begin to slide back toward their original position.

The invention also resides in the provision of a second set of cams which turn the rods back and swing the fingers into the path of the articles during the final movement of the rods in returning to their original position.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figure 1 is a plan view with parts broken away of a transfer mechanism embodying the novel features of the present invention.

Fig. 2 is a schematic perspective view of the transfer mechanism.

Fig. 3 is a chart indicating the movement of the transfer fingers.

Fig. 4 is a fragmentary sectional view taken along the line 4—4 in Fig. 1.

Fig. 5 is a sectional view taken along the line 5—5 in Fig. 1.

Fig. 6 is a view similar to Fig. 5 showing the parts in different positions.

Fig. 7 is a fragmentary plan view of one of the cams.

Fig. 8 is a sectional view taken along the line 8—8 in Fig. 1.

Fig. 9 is a fragmentary side view of the parts shown in Fig. 8.

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Fig. 10 is a fragmentary sectional view taken along the line 10—10 in Fig. 4.

Fig. 11 is a fragmentary perspective view of the cam mechanism shown in Fig. 7.

Fig. 12 is a sectional view taken along the line 12—12 in Fig. 1.

Fig. 13 is a side elevation of the modified form of the invention.

Fig. 14 is a plan view of the modified construction.

Fig. 15 is a fragmentary perspective view of a portion of the transfer mechanism shown in Figs. 13 and 14.

For purposes of illustration, the invention as shown in the drawings is used to move work trays loaded with articles to be heat treated along a straight path through a furnace 20. The latter defines alined heating chambers 21 and 22 separated by a door 23 and is closed at its front and rear ends by doors 24 and 25 respectively. In using such a furnace, two trays 26 and 27 are heated in the furnace chambers while a third tray 28 is loaded and placed on a platform 29 which is in front of the door 24 and is level with the floor of the furnace. After the heating period is completed, the furnace doors are opened and the tray 27 is removed from the furnace while the tray 26 is advanced to the chamber 22 and the tray 28 is slid along the loading platform and onto the floor of the chamber 21 preparatory to a second period of heating.

To advance the trays 26 and 28, a pair of parallel elongated rods 30 are disposed on opposite sides of the trays and are journaled on the frame 31 of the platform 21 in the spaced bearings 32 and 33 for turning and for endwise sliding. Behind the bearings 32 are rounded troughs or ways 34 (Fig. 11) which support the overhanging rear end portions of the rods. The latter slide from a position in which their forward ends are outside the furnace 20 adjacent the door 24 as shown in full in Fig. 1 to the position shown in broken lines in which the rods project into the chamber 22. The forward portion of each rod is tubular and receives the end of a finger 35 which is rigid with the rod and is bent inwardly toward the finger on the other rod to project in behind and engage the tray 26 as shown in Fig. 12. Behind the fingers 35 a distance corresponding to the spacing of the trays is an abutment 36 carried by the rods and adapted to engage the back side of the tray 28.

When the rods 30 are slid forward, the fingers 35 abut against the tray 26 and, at the same time, the abutment 36 engages the tray 28. Upon the continued movement of the rods, the fingers and the abutment push their respective trays into the chamber 22 and 21. After the rods have reached their forward position, they are turned to swing the fingers up and then are retracted to their original position. By turning the rods, the fingers

are out of the path of the trays and pass clear of the tray 28 during the return movement.

The present invention contemplates the provision of a novel mechanism for swinging the fingers 35 automatically as an incident to the endwise sliding of the rods 30 so that the fingers will be out of the path of the trays during the return stroke of the rods. For this purpose, the frame 31 and the rods 30 carry cams and followers 38 and 39 which operate to turn the rods and swing the fingers up as the fingers leave the tray 26 and before they reach the tray 28. On the forward stroke of the rods, the cams are inactive so that the fingers remain in position behind the tray 26 as the rods slide into the furnace 20. With this arrangement, the fingers are down during the entire forward stroke as represented by the line 40 in Fig. 3 and, in the initial part of the return stroke, are swung up as indicated at 41 in the line 42 representing the return movement of the rods.

In the present instance, the cams 38 are mounted alongside the rods 39 on channel bars 43, which form the sides of the frame 31, and are disposed intermediate the ends of the channel bars behind the bearings 32. As shown in Figs. 7 and 11, each cam is an elongated member of arcuate cross section and is generally parallel to the path of the corresponding rod. A pin 44 rigid with and upstanding from the rear end of the cam projects through and is journaled in the upper leg 45 of the channel bar 43 to support the cam for pivoting about the vertical axis defined by the pin. Acting between the leg 45 and the pin 44 is a torsion spring 46 which tends to turn the pin and swing the free end 47 of the cam inwardly toward the center of the frame 31. To limit the swinging of the cam, an angle bracket 48 welded to the channel bar leg 45 and overhanging the cam projects down alongside the free end 47 of the cam and serves as a stop against which the cam end abuts.

Along its outer edge, the cam 38 is formed with a helical surface 49 (Figs. 7 and 11) which turns outwardly progressively from its front to its rear end and extends through a quarter of a turn. The inner surface 50 of the cam is horizontal and is straight along the pivoted end of the cam, then curves inwardly and is straight again along the free end portion 47. The desired shape of the cam may be obtained conveniently by cutting a pipe to the length of the cam and then along lines corresponding to the outer and inner cam surfaces 49 and 50.

Herein, the cam followers 39 are pins rigid with and projecting radially from the trailing end portions of the rods 30. When the fingers 35 are down in the active position behind the tray 26, the pins 39 are vertically disposed. As the rods move forward, the pins engage the inner surfaces 50 of the cams 38 and swing the cams outwardly to the position shown in broken lines in Fig. 7, against the action of the springs 46. Thus, on the forward stroke, the cams yield permitting the pins to pass without turning the rods 30. After the follower pins leave the cam surfaces 50, the springs 46 swing the cams back against the stops 48. As shown in Fig. 11, the forward stroke of the rods ends with the pins stopped short of the bearings 32 and just beyond the cams.

On the return stroke of the rods 30, the pins 39 travel the short distance from the bearings 32 to the free ends 47 of the cams 38 and then, since the cams are in against the stops 48, the pins engage the outer cam surfaces 49. Because the cams are held against further inward swinging by the stops 48, the follower pins are forced outwardly by the cam surface 49 thus turning the rods through a quarter of a revolution. It will be seen that the position of the cams 38 on the frame 31 is such that the rods are turned as the fingers 35 travel between the tray 26 which they have just transferred and the tray 28 moved by the abutment 36.

By virtue of the automatic swinging of the fingers 35, it is necessary only to slide the rods 30 forward and back making it possible to use a single power actuator 37 to effect the entire operation of the transfer mechanism. In the form shown in Figs. 1 through 11, the power actuator for moving the rods is a piston 51 sliding in a cylinder 52 which is disposed between and parallel to the rods and is supported at opposite ends by crossbars 53 of the frame 31. To connect the piston to the rods, the outer end of the piston rod 54 is welded or otherwise fastened to a crosspiece 55 spanning the rods intermediate the ends thereof. In order that the rods may turn to swing the fingers 35, the crosspiece 55 is connected to the rods by sleeves 56 welded to the ends of the crosspiece, the rods being journaled in the sleeves.

Herein, each rod 30 is formed by a tubular section 57 (Fig. 10) in front of the sleeves 56 and a solid section 58 behind the sleeves and the two sections are joined together by a stub shaft 59. The latter is stepped to form three parts 60, 61 and 62 of increasing diameter and the smaller end 60 projects into a recess 63 in the end of the solid section 58 while the larger end 62 is received in the adjacent end of the tubular section 57 and the sleeve 56, which is of the same diameter as the rod sections, surrounds the middle part 61. An annular flange 64 on the stub shaft 59 between the parts 61 and 63 provides a shoulder against which the tubular section is fitted and is spaced a sufficient distance from the end of the rod section 58 to permit the stub shaft to turn in the sleeve 56 without binding.

Conveniently, the crosspiece 55 may support the abutment 36 and, for this purpose, a plate forming the abutment is welded to the front of the crosspiece. In order that the abutment plate 36 may move into the furnace chamber 21, the front bearings 33 are split on their inner sides to form a slot 65 (Fig. 4) through which the end portions of the crosspiece may pass. Since the sleeves 56 are flush with the rod sections 57 and 58, they may slide through the bearings 33 as the rods move back and forth.

To actuate the piston 51, compressed air from a supply line 66 is admitted first to the head end of the cylinder 52 to slide the rods 30 forward and then, after the rods have reached their forward position, to the rod end of the cylinder to return the rods to their original position. For this purpose, a valve 67 is interposed in the supply line 66 and communicates with the head end of the cylinder through a line 68 and with the rod end through a line 69. The valve members 70 are urged by a spring 71 to the right as viewed in Fig. 2 to open the line 69 and are shifted to the left by a solenoid 72 to connect the supply line 66 with the line 68.

Energization of the solenoid 72 is effected by closing a push button switch 73 which energizes a relay 74 to close a switch 75 of the relay and complete the circuit of the solenoid. A second switch 76 of the relay completes a holding circuit for the relay through a normally closed limit switch 77. The latter is suitably mounted to be

opened by the rods 30 as they reach the forward position so that the holding circuit then is opened permitting the relay switch 75 to open and deenergize the solenoid 72. With the solenoid deenergized, the spring 71 shifts the valve members 70 to the right and thus air is admitted to the rod end of the cylinder 52 sliding the piston 51 and hence the rods 30 back to their original position.

When the rods 30 have been retracted, they may be turned to swing the fingers back down by turning hand levers 78 rigidly mounted on the rear ends of the rods, but it is preferred to effect such turning automatically at the end of the return stroke. To this end, a second pair of cams 79 are mounted on the channel bars 43 adjacent the rear end of the frame 31 and in the paths of the follower pins 39. As shown in Fig. 9, the surfaces 80 of these cams are helical and extend through a quarter turn similar to the outer surfaces 49 of the cams 38 but in the opposite direction. Thus the follower pins, which are horizontal when they reach the cams 79, are turned upwardly by the cam surfaces 80 so that near the end of the return stroke the fingers 35 swing back down into the active position as indicated by the curve 81 in the line 42 in Fig. 3. Since the pins pass clear of the cams 79 on the forward stroke, these cams may be mounted rigidly on the frame as by welding them to a plate 82 which in turn is bolted to the channel bars 43.

In operation, the work tray 28 is placed on the platform 29 and is filled with articles to be heat treated while the trays 26 and 27 are being heated in the chambers 21 and 22. Upon completion of the heating period, the doors 23, 24 and 25 of the furnace 20 are opened and the tray 27 is removed through the back of the furnace. Next, the push button switch 73 is closed to actuate the valve 67 and initiate an automatic cycle of the transfer mechanism. With the valve members 70 shifted to the left, compressed air is admitted to the head end of the cylinder 52 sliding the piston 51 and hence the rods 30 forward.

During the advance of the rods, the fingers 35, which are in the active position at this time, abut against the back of the tray 26 and push this tray from the chamber 21 into the chamber 22. At the same time, the abutment plate 36 similarly engages the tray 28 and moves it from the platform 29 into the chamber 21. On the forward stroke, the follower pins 39 contact the inner surface 50 of the cams 38 which are swung outwardly by the pins against the action of the springs 46 permitting the pins to pass without turning the rods 30. After the pins have passed the cams, the latter are swung back against the stops 48 by the springs.

When the rods 30 reach the forward position shown in broken lines in Fig. 1, the limit switch 77 is opened deenergizing the solenoid 72 and permitting the spring 71 to shift the valve members 70 to the right. The rod end of the cylinder 52 thus is placed in communication with the supply of compressed air and the piston 51 and the rods are moved back toward their original position. During the first portion of the return stroke, the follower pins 39 engage the outer surfaces 49 of the cams 38 which turn the pins and hence the rods outwardly through a quarter revolution. By virtue of such turning, the fingers 35 swing up out of the path of the trays and pass alongside the tray 28 which has just been moved into the chamber 21. When the fingers are at the entrance of the furnace 20 and clear of the tray 28, the follower pins engage the surfaces 80 of

the cams 79 which turn the pins up and swing the fingers down preparatory to another cycle.

In the modified form shown in Figs. 13, 14 and 15 in which similar parts are designated by like reference characters, the transfer rods 30 are reciprocated by an electric motor 83 through the medium of endless chains 84. For this purpose, the latter are disposed within the channel bars 43 of the loading platform frame 31 and are passed around sprocket wheels 85 and 86 (Fig. 14) journaled on the channel bars adjacent the forward and rear ends of the loading platform 29. To drive the chains 84, the forward sprocket wheel 85 is turned through a drive chain 87 by the motor 83 which is suitably secured to the under side of the loading platform.

As shown in Fig. 15, each chain 84 may be welded to an angle bracket 88 which in turn is welded to the adjacent sleeve 56 on the crosspiece 55. With this construction, the sleeves and hence the transfer rods 33 are moved by the chains while, at the same time, the rods are free to turn to swing the fingers 35 up and down.

As in the previous case, the fingers are down during the forward stroke of the rods 30 so that the fingers and the abutment plate 36 advance the trays 26 and 28 to the position shown in Fig. 13 at which time the rods engage a suitable limit switch (not shown) to reverse the motor 83. With the motor reversed, the chains 84 are driven in the opposite direction and slide the rods back to their original position shown in Fig. 14. During the initial portion of the return stroke, the cam followers 39 engage the outer surfaces of the cams 38 to turn the rods and swing the fingers 35 up so that the latter may pass clear of the tray 28. At the end of the return stroke, the follower pins 39 are turned back by the cams 79 to swing the fingers down for the next operation of the transfer mechanism.

It will be observed that the fingers 35 swing up and down automatically as an incident to movement of the transfer rods 30. Because of this action of the fingers, it is necessary only to slide the rods back and forth and such movement of the rods may thus be effected easily through the use of a simple power actuator such as the piston and cylinder 51, 52 or the motor driven chains 84. By using a power actuator, the transfer mechanism is extremely versatile since it is possible to move relatively heavy loads as compared to those which could be moved by hand with prior devices of this type.

I claim as my invention:

1. A material handling apparatus, comprising, a frame, a pair of horizontal elongated rods laterally spaced apart and parallel to each other, means on said frame supporting said rods for turning and for endwise sliding from a first position forward to a second position and back to said first position, a finger rigid with and projecting laterally from each of said rods adjacent the forward ends thereof, said fingers swinging from a generally horizontal position between said rods to an upright position when the rods are turned a quarter revolution in one direction, means on said rods providing an abutment behind said fingers and between the rods, a cam follower on each of said rods, a pair of cams, one disposed in the path of each of said followers and each pivotally mounted on said frame to be swung out of said path by the corresponding follower when said rods are moved toward said second position, said cams having surfaces engageable by said followers in the initial movement of said rods away from said second position and operable to

turn said rods a quarter revolution in said one direction, and a second pair of cams mounted on said frame to be engaged by said followers in the final movement of said rods toward said first position and operable to turn the rods and swing said fingers back to said horizontal position.

2. In an apparatus for moving articles along a rectilinear path, the combination of, a frame, a pair of horizontal elongated rods laterally spaced apart and paralleling said path to straddle said articles, means on said frame supporting said rods for turning and for endwise sliding, a reversible power actuator connected to said rods and operable to slide the rods from a first position forward to a second position and back to said first position, means on said rod and said frame providing cam and follower surfaces operable in the initial movement of the rods toward said first position to turn the rods in one direction, a finger rigid with each of said rods adjacent the forward ends thereof and projecting laterally into said path to engage a transverse part of a first article to be moved, means on said rods providing an abutment spaced behind said fingers a distance greater than the length of an article and adapted to engage a second article in back of the first article, said fingers being swung out of said path upon turning of said rods, and second cam means operable in the final movement of said rods toward said first position to turn the rods in the opposite direction and swing said finger back into said path.

3. In an apparatus for moving work trays along a rectilinear path, the combination, of a frame, a pair of laterally spaced elongated rods extending along said path on opposite sides of the trays to be moved, means on said frame supporting said rods for endwise sliding, a crosspiece spanning said rods intermediate the ends thereof, said rods being journaled in the ends of said crosspiece for turning back and forth, a reversible power actuator connected to said crosspiece and operable to slide said rods from a first position forward to a second position and back to said first position, means on said crosspiece providing an abutment adapted to engage a transverse part of a first tray and move the tray forward as the rods slide toward said second position, a finger rigid with each of said rods and spaced forwardly of said abutment a distance greater than the length of a tray, said fingers projecting laterally into said path to engage a transverse part of a second tray in front of the first tray, and means on said rods and said frame providing cam and follower surfaces operable in the initial movement of said rods away from said second position to turn the rods and swing said fingers out of said path.

4. In a material handling apparatus, the combination of, a frame, a pair of horizontal elongated rods laterally spaced apart and parallel to each other, means on said frame supporting said rods for turning and for endwise sliding, a finger rigid with and projecting laterally from each of said rods adjacent the forward ends thereof, said fingers swinging from a generally horizontal position between said rods to an upright position when the rods are turned a quarter revolution in one direction, means on said rods providing an abutment behind said fingers and between the rods, a reversible power actuator connected to said rods and operable to slide the rods from a first position forward to a second position and back to said first position, a cam follower on each of said rods, and a pair of cams, one disposed in the path of each of said followers and each pivotally mounted on said frame to be swung out of said path by the corresponding follower when said rods are moved toward said second position, said cams having surfaces engageable by said followers in the initial movement of said rods away from said second position and operable to turn said rods a quarter revolution in said one direction.

5. In an apparatus for moving work trays along a rectilinear path, the combination of, a frame, a pair of laterally spaced elongated rods extending along said path on opposite sides of the trays to be moved, means on said frame supporting said rods for turning and for endwise sliding, a reversible power actuator connected to said rods and operable to slide the same from a first position forward to a second position and back to said first position, means on said rods providing an abutment adapted to engage a transverse part of a first tray and move the tray forward as the rods slide toward said second position, a finger rigid with each of said rods and spaced forwardly of said abutment a distance greater than the length of a tray, said fingers projecting laterally into said path to engage a transverse part of a second tray in front of the first tray, means on said rods and said frame providing cam and follower surfaces operable in the initial movement of the rods back toward said first position to turn said rods and thereby swing said fingers out of said path, and mechanism for rendering said cam means inactive during the forward movement of said rods.

6. In an apparatus for moving work trays along a rectilinear path, the combination of, a frame, a pair of laterally spaced elongated rods extending along said path on opposite sides of the trays to be moved, means on said frame supporting said rods for turning and for endwise sliding, a reversible power actuator connected to said rods and operable to slide the same from a first position forward to a second position and back to said first position, means on said rods providing an abutment adapted to engage a transverse part of a first tray and move the tray forward as the rods slide toward said second position, a finger rigid with each of said rods and spaced forwardly of said abutment a distance greater than the length of a tray, said fingers projecting laterally into said path to engage a transverse part of a second tray in front of the first tray, and means on said rods and said frame providing cam and follower surfaces operable in the initial movement of said rods away from said second position to turn the rods and swing said fingers out of said path.

7. In an apparatus for moving articles along a rectilinear path, the combination of, a frame, an elongated rod paralleling said path, means on said frame supporting said rod for turning and for endwise sliding from a first position forward to a second position and back to said first position, a finger rigid with and projecting laterally from said rod adjacent the forward end thereof to swing in behind and out away from a transverse part of a first article to be moved when the rod is turned back and forth, means on said rod providing an abutment spaced behind said finger a distance greater than the length of an article and adapted to engage and move a second article in back of the first article, means on said rod and said frame providing cam and follower surfaces operable in the initial movement of the rod toward said first position to turn

the rod in one direction and swing said finger away from the articles, and second cam means operable in the final movement of said rod toward said first position to turn the rod in the opposite direction and swing said finger back in behind said second article.

8. In an apparatus for moving articles along a rectilinear path, the combination of, an elongated rod paralleling said path, means on said frame supporting said rod for turning and for endwise sliding from a first position forward to a second position and back to said first position, cam mechanism operable in the movement of said rod away from said second position to turn the rod, a finger rigid with said rod adjacent the forward end thereof and projecting laterally into said path to engage a transverse part of an article to be moved, and means for rendering said cam mechanism inactive on the forward movement of said rod, said fingers being swung out of said path upon turning of said rod to pass clear of other articles in the path as the rod is returned to said first position.

9. In an apparatus for moving articles along a rectilinear path, the combination of, a frame, an elongated rod paralleling said path, means on said frame supporting said rod for turning and for endwise sliding from a first position forward to a second position and back to said first position, a finger rigid with and projecting laterally from said rod adjacent the forward end thereof to swing in behind and out away from a transverse part of an article to be moved when the rod is turned back and forth, and means on said rod and said frame providing cam and follower surfaces engageable in the initial movement of the rod away from said second position and operable to turn the rod and swing said finger out of engagement with the article.

10. In an apparatus for moving articles along a rectilinear path, the combination of, a frame, an elongated rod paralleling said path and mounted on said frame for endwise sliding and for turning, a reversible power actuator connected to said rod and operable to slide the rod from a first position forward to a second position and back to said first position, means on said rod and said frame providing cam and follower surfaces operable in the movement of the rod adjacent said second position to turn the rod, a finger rigid with said rod adjacent the forward end thereof and projecting laterally into said path to engage a transverse part of a first article to be moved, and means on said rod providing an abutment spaced behind said finger a distance greater than the length of an article and adapted to engage and move a second article in back of the first article, said finger being swung out of said path upon turning of said rod to pass clear of the second article as the rod is returned to said first position.

11. In an apparatus for moving articles along a rectilinear path, the combination of, a frame, an elongated rod paralleling said path, means on said frame supporting said rod for turning and for endwise sliding from a first position forward to a second position and back to said first position, a finger rigid with and projecting laterally from said rod adjacent the forward end thereof to swing in behind and out away from a transverse part of a first article to be moved when the rod is turned back and forth, means on said rod providing an abutment spaced behind said finger a distance greater than the length of an article and adapted to engage and move a second article in back of the first article, and means operable as an incident to the initial movement of the rod away from said second position to turn the rod and swing said finger out of engagement with the article.

12. In an apparatus for moving articles along a rectilinear path, the combination of, a frame, an elongated rod paralleling said path, means on said frame supporting said rod for endwise sliding from a first position forward to a second position and back to said first position, a finger mounted on said rod and movable angularly to swing into and out of said path, and cam and follower elements, one mounted on said frame and the other on said rod, said elements having surfaces engageable during a portion of the endwise movement of said rod and operable automatically as an incident to such movement to swing said finger.

13. Mechanism for moving articles along a rectilinear path comprising a frame, a pair of laterally spaced elongated rods extending along said path on opposite sides of the articles to be moved, means on said frame supporting said rods for turning and for endwise sliding, a cylinder mounted on said frame, a piston sliding in said cylinder and connected to said rods, means for admitting fluid to the ends of said cylinder to slide said piston back and forth thereby to move said rods from a first position forward to a second position and back to said first position, means on said rods providing an abutment adapted to engage a transverse part of a first article and move the article forward as the rods slide toward said second position, a finger rigid with each of said rods and spaced forwardly on said abutment a distance greater than the length of an article, said finger projecting laterally into said path to engage a transverse part of a second article in front of a first article, and means on said rods and said frame providing cam and follower surfaces operable in the initial movement of said rods away from said second position to turn the rods and swing said fingers out of said path.

14, Mechanism for moving articles along a rectilinear path comprising a frame, a pair of laterally spaced elongated rods extending along said path on opposite sides of the articles to be moved, means on said frame supporting said rods for turning and for endwise sliding, an endless chain supported by said frame, a reversible motor operatively connected to said chain to drive the same back and forth thereby to slide said rods from a first position forward to a second position and back to said first position, means on said rods providing an abutment adapted to engage a transverse part of a first article and move the article forward as the rods slide toward said second position, a finger rigid with each of said rods and spaced forwardly on said abutment a distance greater than the length of an article, said fingers projecting laterally into said path to engage a transverse part of a second article in front of a first article, and means on said rods and said frame providing cam and follower surfaces operable in the initial movement of said rods away from said second position to turn the rods and swing said fingers out of said path.

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Number	Name	Date
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