April 7, 1942. H. E. VEIT 2,278,599

SORTING MACHINE

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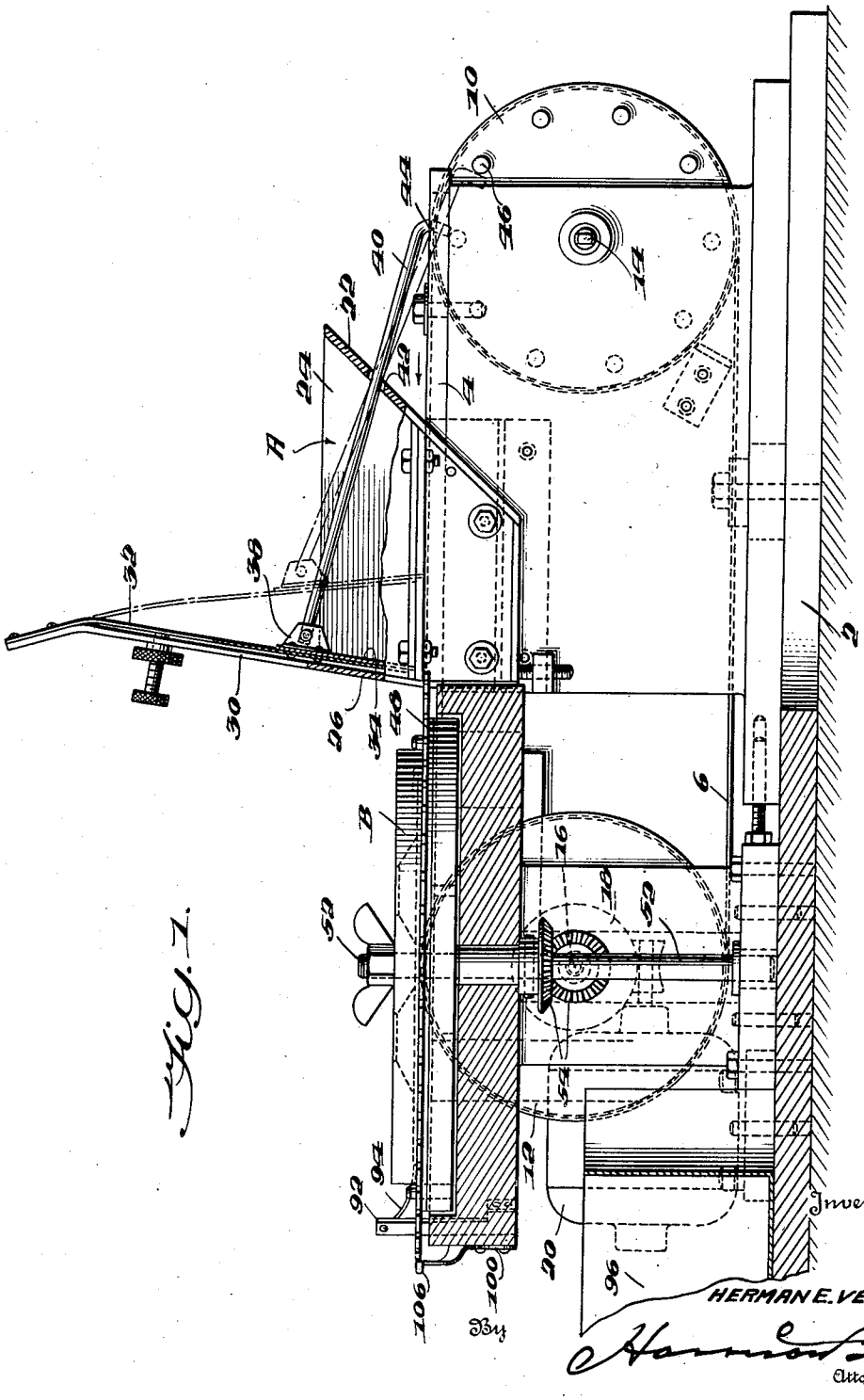

Fig. 1.

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SORTING MACHINE

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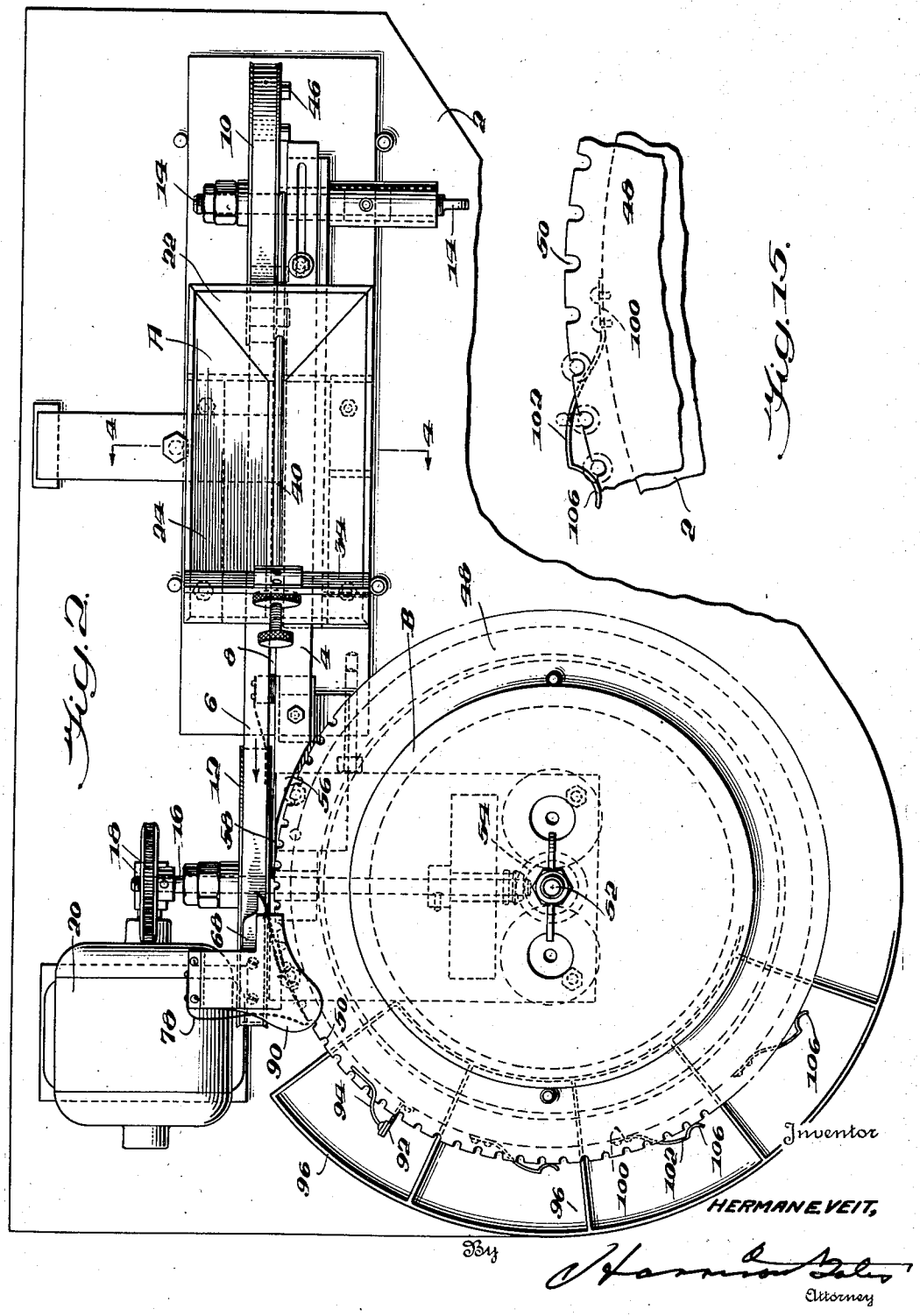

Fig. 2.

Fig. 15.

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SORTING MACHINE

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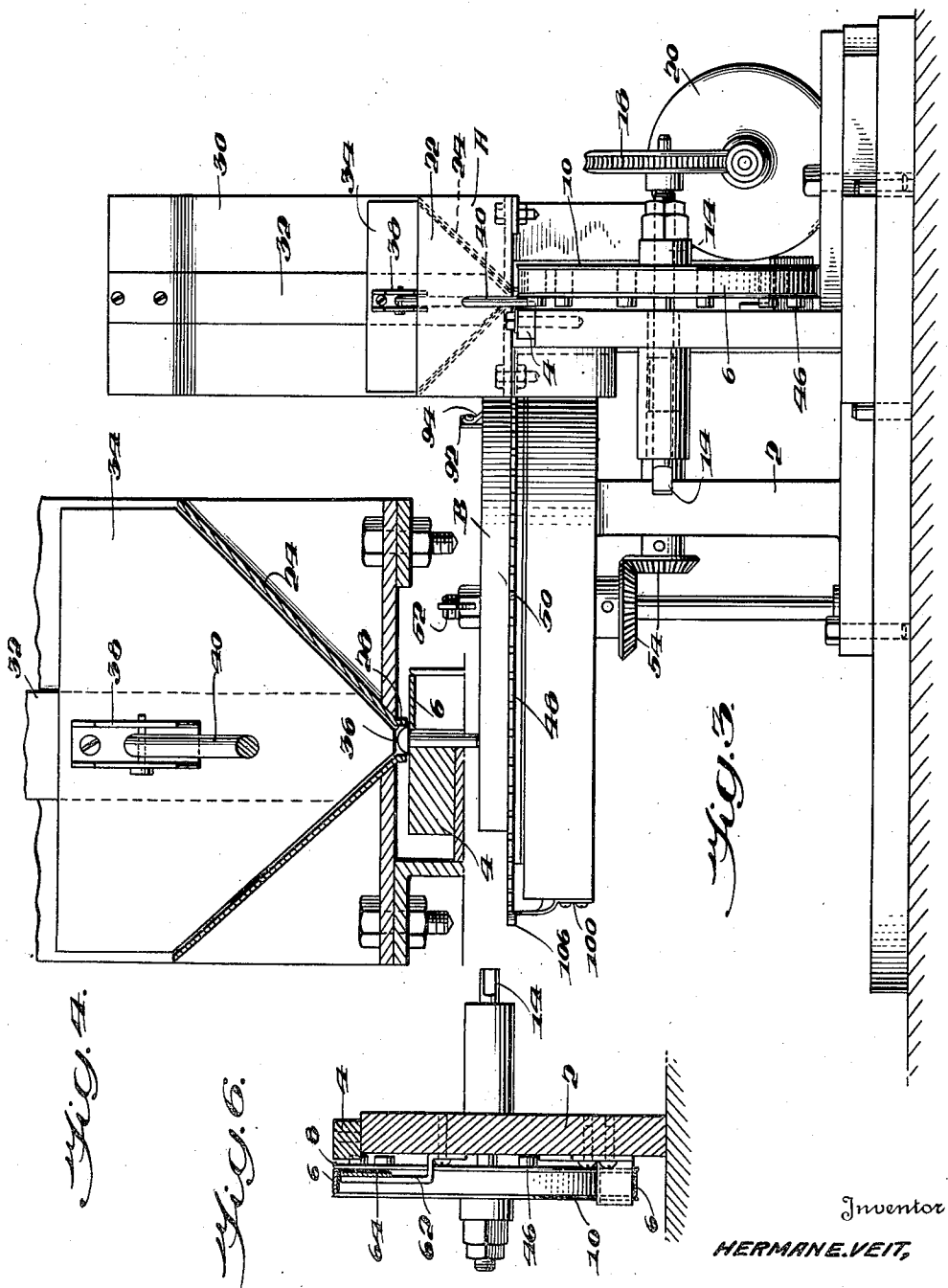

Fig. 3.

Fig. 4.

Fig. 6.

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April 7, 1942. H. E. VEIT 2,278,599

SORTING MACHINE

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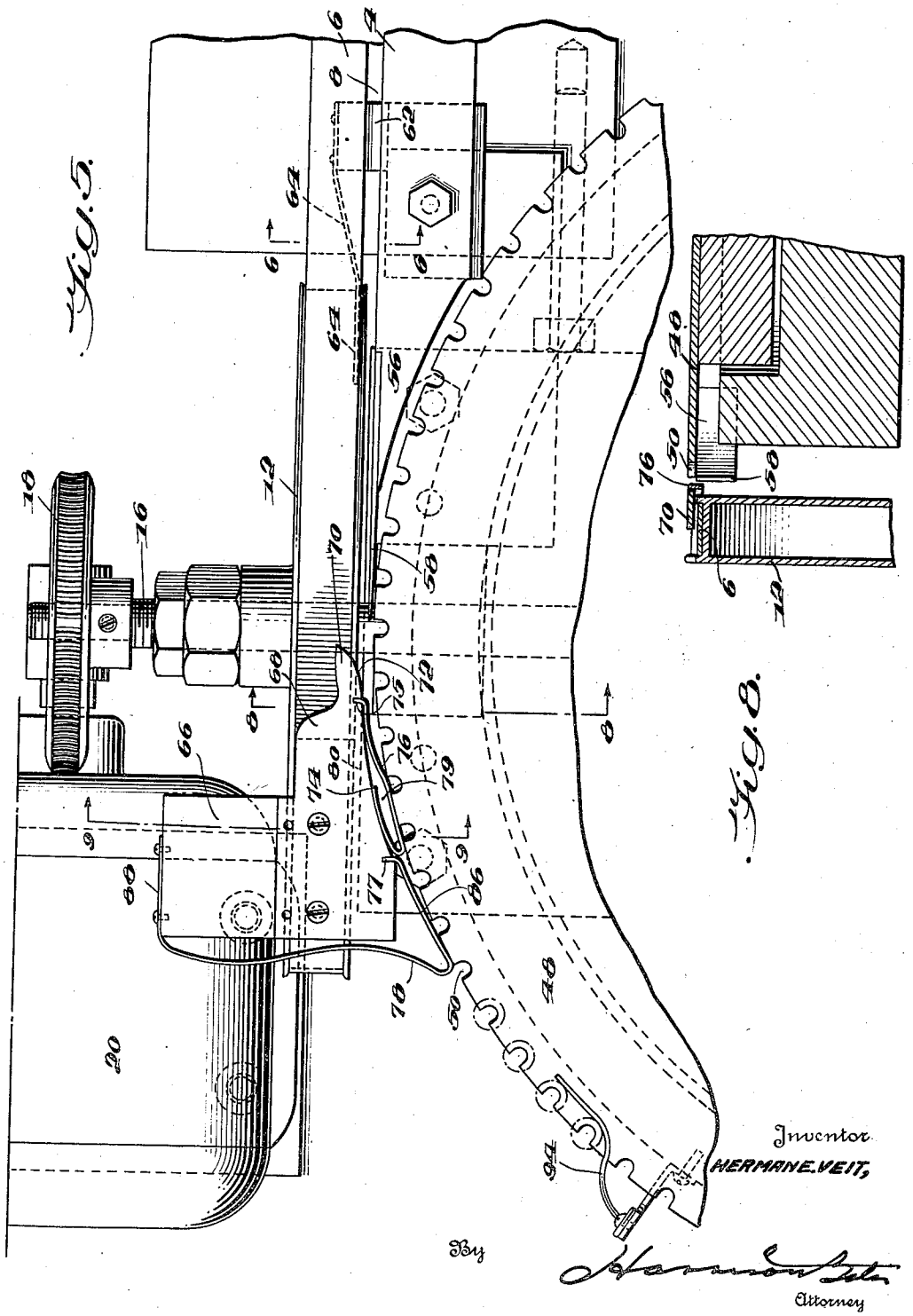

Fig. 5.

Fig. 6.

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SORTING MACHINE

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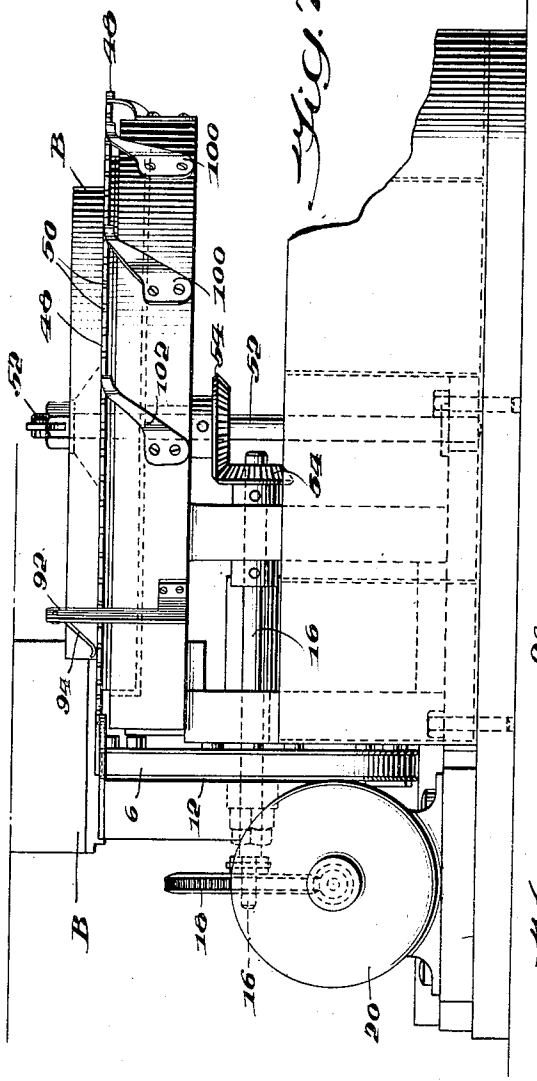

Fig. 7.

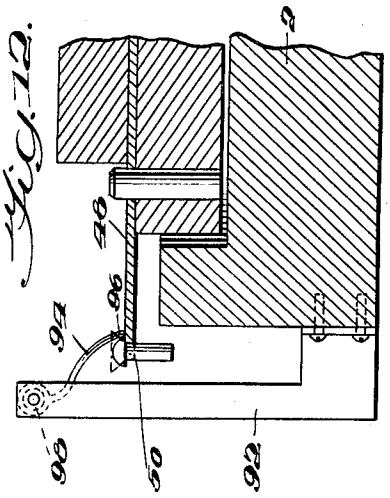

Fig. 12.

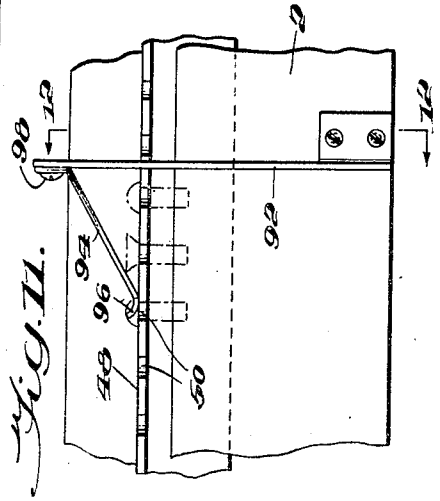

Fig. 11.

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SORTING MACHINE

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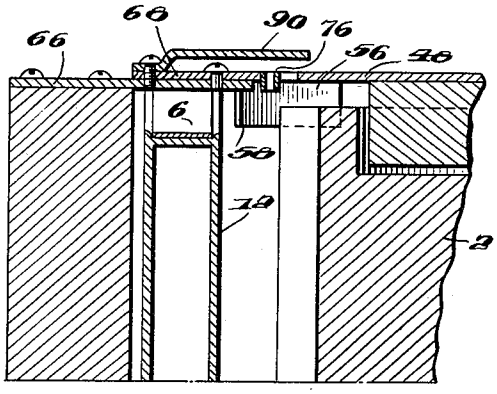

Fig. 9.

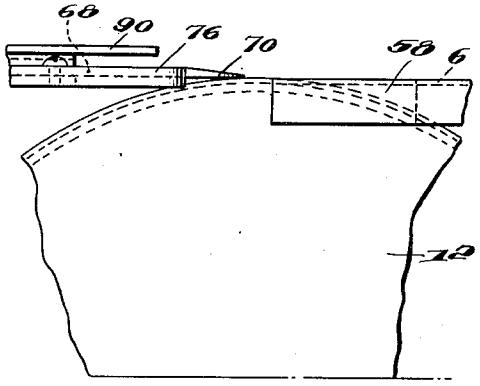

Fig. 10.

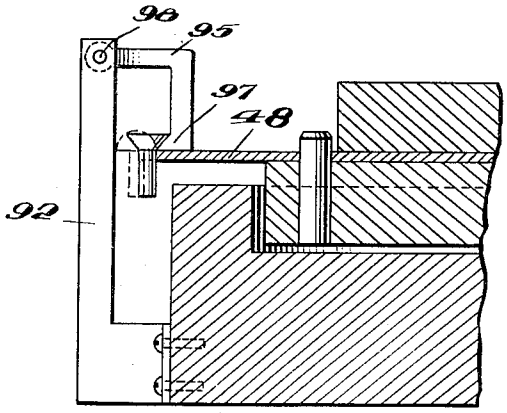

Fig. 13.

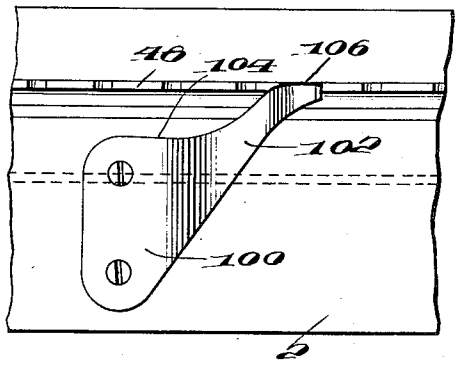

Fig. 14.

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Patented Apr. 7, 1942

2,278,599

UNITED STATES PATENT OFFICE

2,278,599

SORTING MACHINE

Herman E. Veit, Parkville, Md., assignor to The Glenn L. Martin Company, Baltimore, Md.

Application May 14, 1940, Serial No. 335,041

13 Claims. (Cl. 209—90)

The invention relates to a machine for sorting fasteners, and particularly to a machine especially designed for sorting rivets.

The primary object of the invention is to provide a machine which will sort rivets or other fasteners in accordance with their length.

In shop practice, rivets are sent to different machine operators, in the proper lengths. Some of these rivets are dropped, and others are not used. In order to save them, it is usual to collect all the dropped and unused rivets together, regardless of their length, and to return them to stock.

In the past it has been customary when desired to resort these rivets. Sorting of the rivets by hand requires considerable time and expense. The object of the present invention therefore is to provide a machine which will accomplish the sorting of the rivets so that considerable saving of labor is effected.

Still another object of the invention is to provide a machine especially adapted for sorting rivets having the same type of head, and which is provided with means which may be used as desired to separate countersunk rivets from round head rivets or vice versa, and thereafter to separate the rivets of one type in accordance with length. By rendering this separating means inoperative, the other type of rivet may then be separated in accordance with their length.

Still another object of the invention is to provide a novel means for feeding rivets into a slot from which they may be supplied in proper position to a separating mechanism. These means act to prevent the rivets from being fed to the machine unless they are properly positioned.

Another object of the invention is to provide a device of this type which operates entirely automatically, and requires no manual control.

Still a further object of the invention is to provide means which insure the proper separation of the rivets, and which will prevent the rivets from being wrongly sorted. Particularly, since the machine involves a rotating rivet-carrying disc from which progressively shorter rivets are removed, the machine includes means for preventing the discharge of rivets from the disc by centrifugal force, except when they have reached the proper position for their discharge in accordance with their length.

Further objects and advantages will be seen from the following description taken together with the accompanying drawings which form a part thereof.

In the drawings:

Fig. 1 is a side elevation partly in section of a machine embodying my invention;

Fig. 2 is a top plan view thereof;

Fig. 3 is an end view from the right-hand side of Fig. 1;

Fig. 4 is a cross-section substantially on the line 4—4 of Fig. 2;

Fig. 5 is an enlarged top plan view of the left-hand end of the machine in Fig. 1;

Fig. 6 is a cross-section on the line 6—6 of Fig. 5;

Fig. 7 is an end view from the left-hand end of Fig. 1;

Fig. 8 is a cross-section on the line 8—8 of Fig. 5;

Fig. 9 is a cross-section on the line 9—9 of Fig. 5;

Fig. 10 is a side elevation of the belt wheel and the member for removing rivets therefrom;

Fig. 11 is a detail side elevation of a mechanism for removing countersunk rivets;

Fig. 12 is a cross-section on the line 12—12 of Fig. 11;

Fig. 13 is a detail view of a mechanism for removing round head rivets;

Fig. 14 is a detail side elevation of one of the stations for separating the rivets according to length, and

Fig. 15 is a top plan view thereof.

As stated above, the invention is intended to apply to the separation of rivets according to their length, with the optional separation of countersunk from round head rivets or vice versa as a primary step.

The mechanism includes generally a hopper section A for feeding the rivets along in a particular order, to a separating section B in which they are assorted according to their length.

The whole machine includes a frame indicated generally at 2. Carried by the frame is a longitudinally extending guide bar 4. Opposite one side of the guide bar 4 and spaced therefrom is an endless belt 6, substantially level with the top edge of the guide bar and providing between them a slot 8. The width of this slot is substantially equal to or slightly greater than the thickness of the stem of the rivets or other fasteners to be assorted. Belt 6 runs over two pulleys 10 and 12 mounted on shafts 14 and 16 respectively near opposite ends of frame 2. Shaft 16 is driven through worm gear 18 by an electric motor 20 or other suitable source of power. By operating the motor 20 it is then apparent that rivets having their stems in the slot 8 and their heads resting on the bar 4 and belt 6 will be moved along, this

movement taking place in the direction of the arrow (Figs. 1 and 2).

The rivets are arranged in the slot to be fed to the separating mechanism B by the hopper mechanism A. This consists of a hopper having inwardly inclined walls including a rear wall 22, side walls 24 and a front wall 26. The side walls are spaced apart at the bottom to provide a slot 28 immediately above the slot 8, but wide enough to permit the passage of a rivet head.

In order to agitate the rivets contained in the hopper, and at the same time to prevent the escape of rivets from the hopper unless they are properly positioned, the front wall 26 is provided with an upward extension 30, at the upper end of which is secured a spring blade 32. The bottom end of spring blades 32 carries secured thereto a separating wall 34 which substantially fills the space between the side walls 24 of the hopper. The bottom edge 36 of separating wall 34 is so spaced above bar 4 and belt 6 as to leave only substantially enough room for a rivet head to pass therebeneath (see Fig. 4), so that rivets may not escape from the hopper unless they are properly positioned in the slot 8.

The separating wall 34 under the action of the spring 32 would normally take the broken line position shown in Fig. 1. In order to move this separating wall back and forth, it is provided with a lug 38 to which is pivoted a rod 40 passing through an aperture 42 in the rear wall 22 of the hopper. The free end of rod 40 is bent down as at 44, into the path of pins 46 carried by the pulley 10.

The operation of this portion of the device is as follows: Assuming that the hopper A contains rivets, and the motor is started, pulley 10 is driven by pulley 12 and belt 6, and rotates in a counterclockwise direction (Fig. 1). The pins 46 engage the turned-down end 44 of rod 40, in the broken line position, and push this rod towards the left. As the rod moves towards the left, it fulcrums in the opening 42, and finally reaches the position shown in solid lines. In this position, the pin 46 slides under the end 44, and spring 32 then pushes the wall 34 back to the broken line position shown, in which the end 44 of rod 40 engages the next pin 46. Wall 34 is thus subjected to continuous reciprocation, which agitates the rivets and causes them to take up the proper positions in the slot 8, after which they are fed by belt 6 to the separating mechanism.

The principal element of the separating mechanism is a disc 48 having in its periphery a series of notches 50 substantially of the dimension of the rivet stem. This disc is secured on a vertical shaft 52 which is driven by bevel gearing 54 from shaft 16, and thus moves in unison with the belt. The disc 48 has its periphery slightly spaced from the belt 6 at the point where this belt engages wheel 12. The slot 8 is continued up to the point where belt 6 and disc 48 most closly approach each other by a projection 56 having secured thereto a thin metal blade 58 extending up practically to the vertical projection of the axis of shaft 16 (see Fig. 5). This construction feeds the rivets up to the disc 48.

In order to prevent rivets from becoming entangled between the belt 6 and the wheel 12, there is provided beneath the belt 6 and adjacent the wheel 12 (see Figs. 5 and 6) a member 62 extending from the frame 2 beneath the belt, and having a portion 64 arranged closely beneath the belt and inclined from the center of the belt towards the edge of the slot 8. Any rivet which might tend to tilt under the belt is thus straightened out just before it reaches the wheel 12 and is thus prevented from being caught between the wheel and the belt.

It is now necessary to transfer the rivets from the belt to the notches 50 in the disc 48. This is accomplished by the arrangement shown particularly in Figs. 5, 8 and 10. Mounted on the frame of the machine is a block 66. Carried by this block is a plate 68 which has a tongue 70 extending up close to the top of wheel 12, but mounted at a slight distance from the top so that the upper surface of tongue 70 is substantially level with the top of the belt 6 where it passes over the axis of shaft 16. Rivets carried by the belt 6 may thus engage with their heads on the top surface of tongue 70. Tongue 70 has a curved cam surface 72 which extends across the vertical projection of the edge of pulley 12, and is continued by a curved surface 74 substantially concentric with the periphery of disc 48, and spaced therefrom by the thickness of the stem of a rivet.

Mounted on the edge 72 of the plate 68 by inwardly turned ends 75 and 77 engaged in notches in the plate are spring members 76 and 78 respectively. Spring member 76 has its one end 75 connected to the plate, and is then bent back upon itself to provide a U-shaped portion the legs of which normally lie in engagement with the periphery of disc 48 and the edge of plate 68 respectively. The second spring 78 has one end 77 secured to the plate 68 and a portion 86 which at its outer end engages the periphery of disc 48, while its other end 88 is secured to the block 66.

The whole arrangement may be covered by a plate 90 (not shown in Fig. 5) which tends to prevent rivets from jumping upwardly out of their spaces.

The operation of this portion of the device is as follows: As the rivets reach the point opposite the disc 48, their heads ride on the periphery of this disc. The other sides of the heads are engaged by the tongue 70, and are thus lifted from the belt 6 to rest on the plate 68. Succeeding rivets push the rivets on into the space 79, where their stems are engaged successively by the springs 76 and 78. These springs tend to push the rivets towards the center of the disc 48, and as one of the notches 50 comes opposite any rivet the rivet will be forced into the notch and thus carried along by the disc 48. The rivets are then arranged in succeeding notches of the disc 48 for separation.

Where the machine is to be used only for sorting rivets having one type of head, the separation may proceed immediately. It is often desirable, however, to remove countersunk rivets from the round head rivets or vice versa before the machine separates the round head rivets according to their length. The mechanism for accomplishing the first type of separation is shown particularly in Figs. 11 and 12.

Mounted on the frame 2 is an upright 92 which is slightly spaced from the periphery of the disc 48. At its upper end this upright carries a wire or rod 94. The free end 96 of this rod rests on the upper surface of disc 48.

As shown in Fig. 12, the rod 94 is so curved that a round head rivet may pass by its lower end 96 without engaging it. On the other hand, a countersunk rivet, as shown in dotted lines in Fig. 12, will engage the wire 94 with its upper

edge. It will thus be pushed outwardly by the continued rotation of disc 48, and will drop off of the disc into the first container 96 provided below the edge of the disc. Thus countersunk rivets are removed.

Spring 94 is held on the upright 92 by a screw 98, which may be loosened so that the spring may be moved out of position and rendered inoperative. When the machine is used for separating rivets regardless of their head shape, or when it is used for operating on countersunk rivets, the spring 94 is not used. Instead, the device shown in Fig. 13 may be utilized for eliminating round head rivets. Screw 98 holds on upright 92 a bent member 95 having at its lower end a wedge shaped member 97 which rests on the surface of disc 48 with its edge pointed outwardly and substantially aligned with the inner edges of notches 50. As is clear from the drawing, a countersunk rivet can pass over this wedge, whereas the head of a round head rivet will be engaged thereby, so that the rivet will be pushed off the disc.

The rivets which have passed the spring 94 are now fed on to a series of stations which successively eliminate rivets of different sizes, preferably removing the longest rivets first. The structure for accomplishing this separation is shown particularly in Figs. 7, 14 and 15.

Each of the separating mechanisms is provided opposite a container 96 for catching the rivets removed. It consists of a spring metal member having one end 100 secured to the frame 2 below the disc 48. The main body 102 of the member is gradually curved outwardly until it extends beyond the vertical projection of the periphery of disc 48 (see Fig. 15). The upper edge 104 of the separating member is gradually curved upwardly as seen in Fig. 14. This edge is generally horizontal close to the frame 2, but begins to turn up sharply just after it clears the vertical periphery of the disc.

The effect of this construction is the following: As a rivet moves along with the disc 48, if its length is shorter than the distance between the disc 48 and the horizontal portion of edge 104, it will pass over this horizontal portion and will then move behind the body portion 102 of the separating member. It will thus be maintained in its position on the disc. If, on the other hand, the end is longer than the space between the disc 48 and the horizontal portion of edge 104, the lower end of the rivet will engage on the outside of the separating member and will be tilted out on the outside of the body portion 102 thereof which, extending upwardly, gradually forces the rivet out of the notch 50 and into the corresponding container 96.

The upper end of the separating member is curved inwardly again as at 106, and rests against the periphery of the disc. The purpose of this is to exert a resilient action on any rivets which may have passed the separating member, so as to push them again well into their notches and to prevent them from gradually sliding out under the action of centrifugal force. Thus the rivets are securely reset in the notches.

As is apparent from Fig. 7, the height of the horizontal portion of the upper edge 104 gradually increases from station to station around the periphery of the disc, so that shorter and shorter rivets are engaged and separated. Thus the rivets may be separated according to their length into any desired number of containers.

It is evident from the above that all that is necessary to operate the machine is to start the motor and place the rivets to be separated into the hopper A. The machine will then operate entirely automatically to separate the rivets into the desired lengths.

While I have described herein one embodiment of my invention I wish it to be understood that I do not intend to limit myself thereby except within the scope of the appended claims.

I claim:

1. A machine for separating rivets or the like having round and countersunk heads in accordance with their head type and length comprising a disc having means to hold rivets in the periphery thereof, means adjacent the point where the rivets are fed to the disc to remove from the disc rivets having one type of head while permitting rivets having the other type of head to pass by such point, and a plurality of means spaced further along the periphery of the disc for successively removing therefrom rivets of progressively varying length.

2. A machine for separating rivets or the like having round and countersunk heads in accordance with their head type and length comprising a disc having a plurality of notches in the periphery thereof, means to feed rivets into the notches of said disc, means to turn said disc, means adjacent the point where the rivets are fed to the disc to remove from the disc rivets having one type of head while permitting rivets having the other type of head to pass by such point, and a plurality of means spaced further along the periphery of the disc for successively removing therefrom rivets of progressively varying length.

3. A machine for sorting rivets or the like comprising a disc mounted to turn about a vertical axis, said disc having rivet-receiving notches, a member having an edge substantially tangential to the disc extending to a point closely adjacent the periphery of the disc, a belt, means mounting said belt for movement parallel to said edge and slightly spaced therefrom in substantially the same horizontal plane, a hopper having a slot in the bottom thereof overlying such space, means operated by said belt-moving means to agitate rivets in said hopper so as to feed the stems of the rivets into such space, means to move said belt towards the disc whereby to feed rivets to the edge of the disc, and means to remove from said disc rivets in accordance with their length.

4. A machine for sorting rivets or the like comprising a disc mounted to turn about a vertical axis, said disc having rivet-receiving notches, a member having an edge substantially tangential to the disc extending to a point closely adjacent the periphery of the disc, a belt, means mounting said belt for movement parallel to said edge and slightly spaced therefrom in substantially the same horizontal plane, means to move said belt towards the disc whereby to feed rivets to the edge of the disc, resilient means to transfer rivets from the belt to the disc, and means to remove from said disc rivets in accordance with their length.

5. In a device as claimed in claim 4, the means for transferring rivets from the belt to the disc comprising a plate having a tongue closely adjacent said belt where it passes by the periphery of the disc, said plate having a curved edge for pushing rivets off of said belt towards the disc, and spring means cooperating with said plate

and disc for pushing said rivets into the notches in the disc.

6. In a device as claimed in claim 4, the means for transferring rivets from the belt to the disc comprising a member having a tongue closely adjacent said belt where it passes by the periphery of the disc, said member having a curved edge substantially concentric with said disc for pushing rivets off of said belt towards the disc, and spring means for pushing said rivets into the notches in the disc, said spring means including a plate spring having a U-shaped portion of which one leg rests against the periphery of the disc while the other leg rests against the said curved edge.

7. In a device as claimed in claim 4, the means for transferring rivets from the belt to the disc comprising a plate having a tongue closely adjacent said belt where it passes by the periphery of the disc, said plate having a curved edge substantially concentric with said disc for pushing rivets off of said belt towards the disc, and spring means for pushing said rivets into the notches in the disc, said spring means comprising a plate spring having one end carried by said member and having a U-shaped portion of which one leg rests against the periphery of the disc while the other leg rests against the said curved edge, and a second spring having a portion resting against the periphery of the disc beyond said first spring.

8. A machine for separating rivets or the like comprising a disc having a plurality of notches in the outer periphery thereof, and a separating means adjacent the periphery of the disc, said separating means comprising a fixed member having a portion extending beneath the disc at a distance to pass shorter rivets thereover, and a portion extending outwardly beyond and lying substantially entirely outside the vertical projection of the outer periphery of the disc to tilt outwardly longer rivets engaged and guided thereto by said first portion so as to discharge the same from the disc, said first portion having a substantially horizontal upper edge and said second portion having an edge inclined upwardly towards the disc, whereby rivets not engaging the first portion pass by the member without engagement with the second portion thereof.

9. A machine for separating rivets or the like comprising a disc having a plurality of notches in the outer periphery thereof, means to turn said disc, means to feed rivets to said notches, and a plurality of separating means spaced around the periphery of the disc, each of said separating means comprising a fixed member having a portion extending beneath the disc at a distance to pass shorter rivets thereover, and a portion extending outwardly beyond the vertical projection of the periphery of the disc to tilt outwardly longer rivets engaged and guided thereto by said first portion so as to discharge the same from the disc, said first portion having a substantially horizontal upper edge and said second portion having an edge inclined upwardly towards the disc, the said horizontal upper edges being progressively closer to the surface of the disc around the periphery thereof, whereby rivets not engaging the first portion of each member pass by such member without engagement with the second portion thereof.

10. In a device as claimed in claim 9, means for transferring rivets from the belt to the disc comprising a plate having a tongue closely adjacent said belt where it passes by the periphery of the disc, said plate having a curved edge substantially concentric with said disc for pushing rivets off of said belt towards the disc, and spring means for pushing said rivets into the notches in the disc.

11. In a device as claimed in claim 9, means for transferring rivets from the belt to the disc comprising a plate having a tongue closely adjacent said belt where it passes by the periphery of the disc, said plate having a curved edge substantially concentric with said disc for pushing rivets off of said belt towards the disc, and spring means for pushing said rivets into the notches in the disc.

12. A machine for sorting rivets or the like comprising a disc mounted to turn about an axis, said disc having rivet-receiving means, a member having an edge substantially tangential to the disc extending to a point closely adjacent the periphery of the disc, a belt, means mounting said belt for movement parallel to said edge at a greater distance from the disc axis than said edge and slightly spaced therefrom in substantially the same horizontal plane, said belt and member forming a slot therebetween, means to feed rivets into such slot, means to move said belt towards the disc whereby to feed rivets to the edge of the disc, means to force rivets from the slot to the rivet-receiving means in the disc, and means to remove from said disc rivets in accordance with their length.

13. A machine for separating rivets or the like comprising a disc having a plurality of notches in the periphery thereof, and a separating means adjacent the periphery of the disc, said separating means comprising a fixed member having a portion extending beneath the disc, and a portion extending outwardly beyond the vertical projection of the disc, said first portion having a substantially horizontal upper edge and said second portion having an edge inclined upwardly towards the disc, said second portion having at its free end a third portion bent backwardly towards the disc and engaging the periphery thereof to press rivets back into the notches which have not been removed by said separating member.

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