Jan. 9, 1940. S. L. BRADBURY 2,186,693

SLIDER, INSPECTING MACHINE

Original Filed April 10, 1935 5 Sheets-Sheet 1

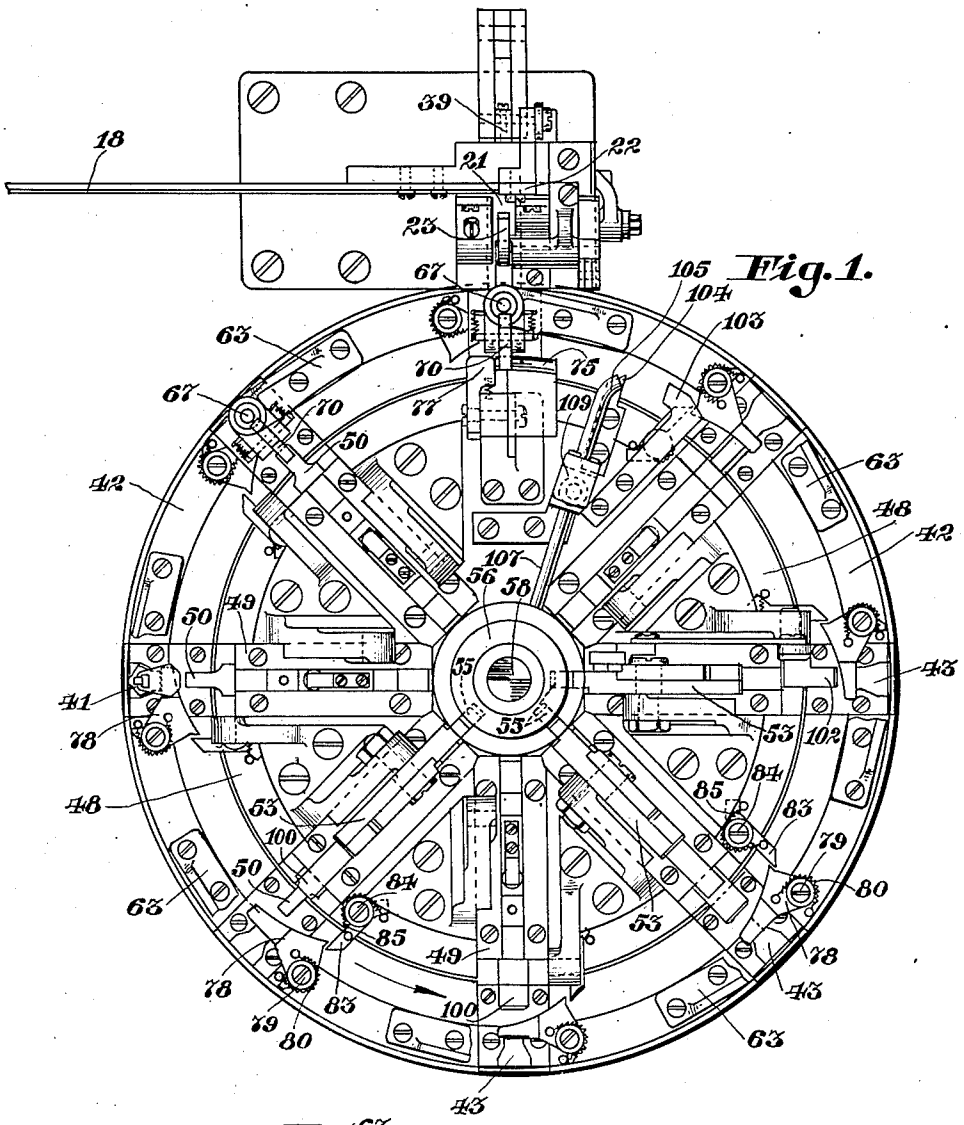


Fig. 1.

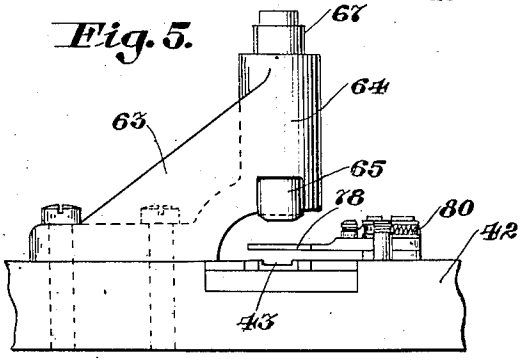


Fig. 5.

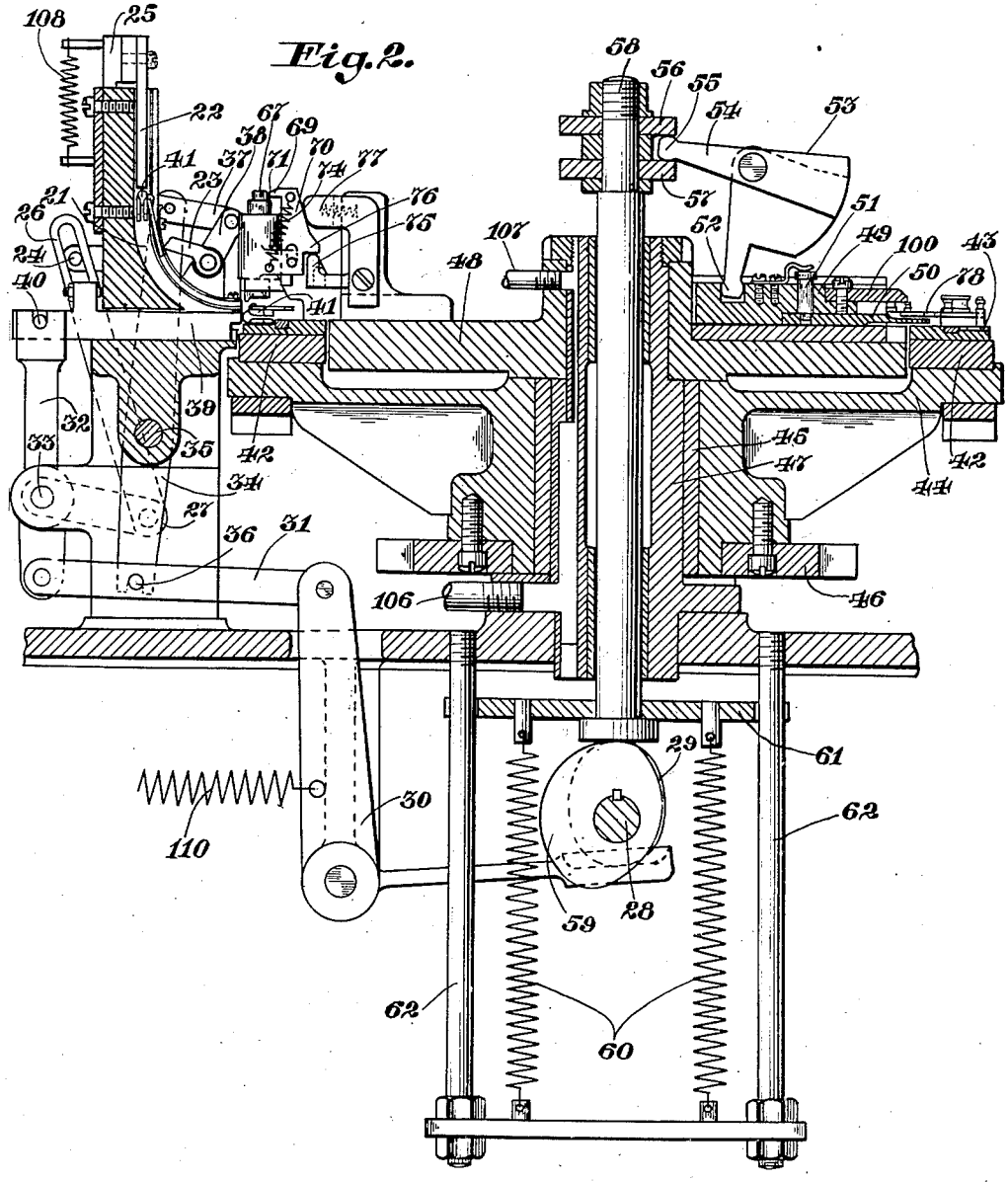
INVENTOR.
Samuel L. Bradbury
BY Kelley & Chisholm.
ATTORNEYS.

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SLIDER INSPECTING MACHINE

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Fig. 2.



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Fig. 3.

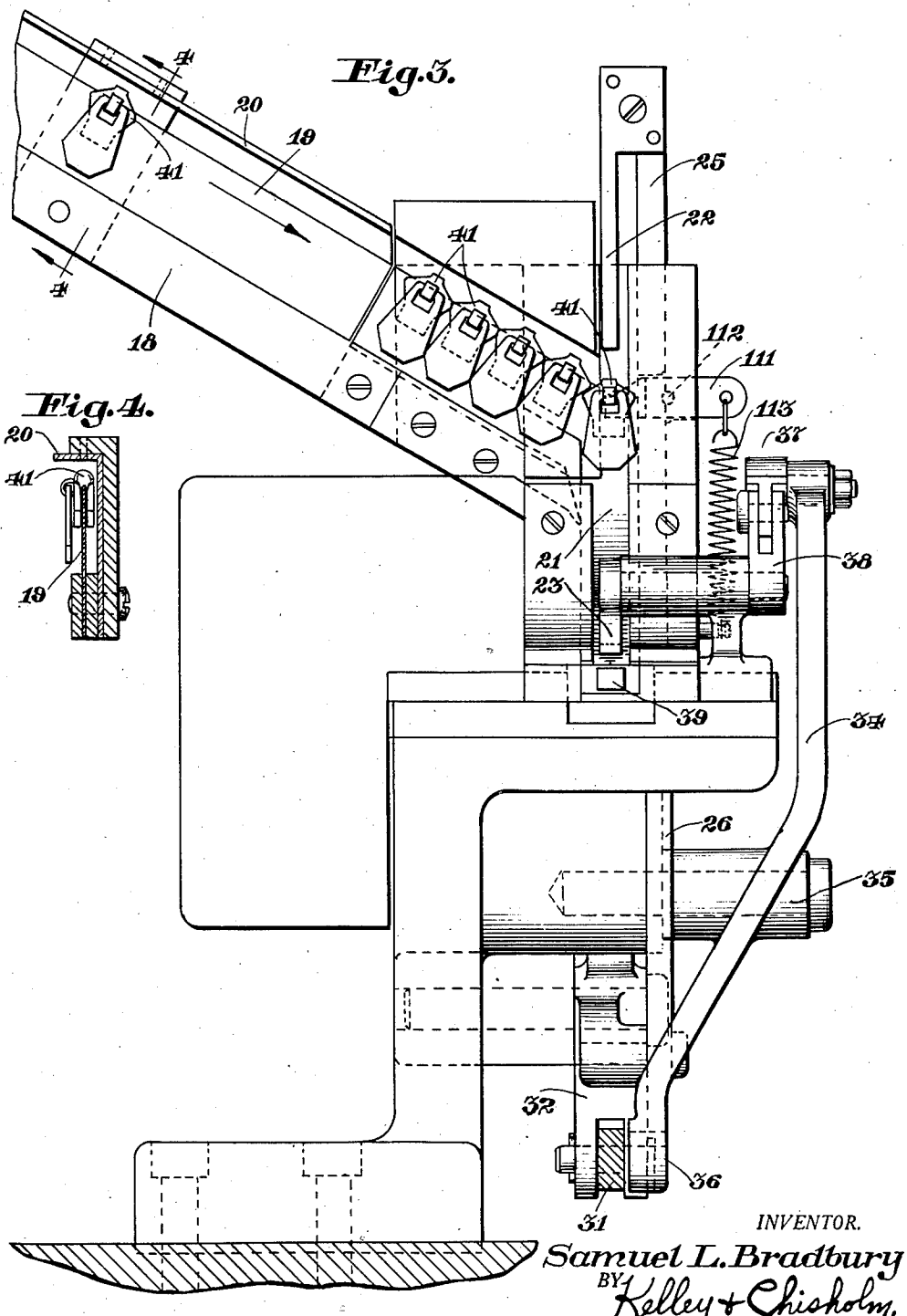


Fig. 4.

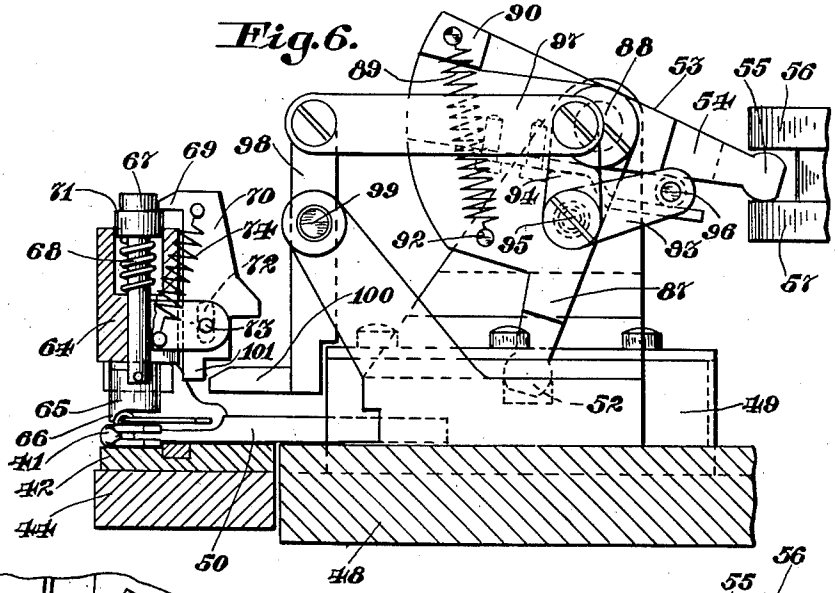
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SLIDER INSPECTING MACHINE

Original Filed April 10, 1935 5 Sheets-Sheet 4

Fig.6.



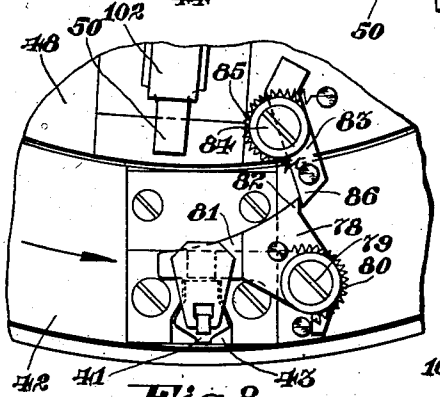


Fig.8.

Fig.7.

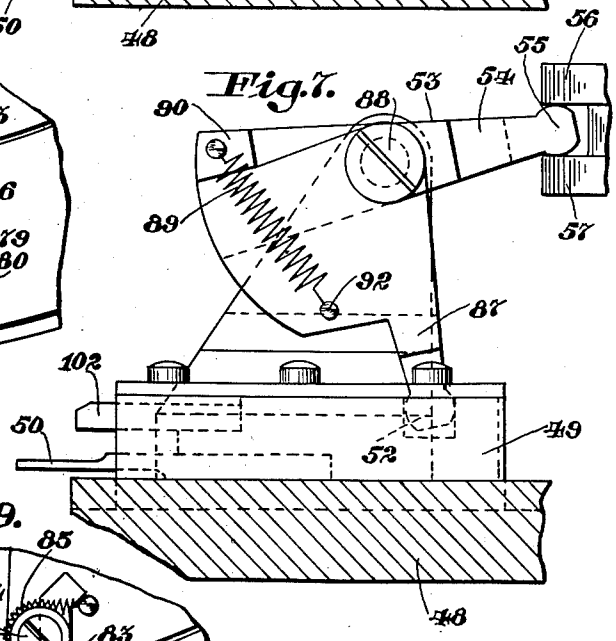
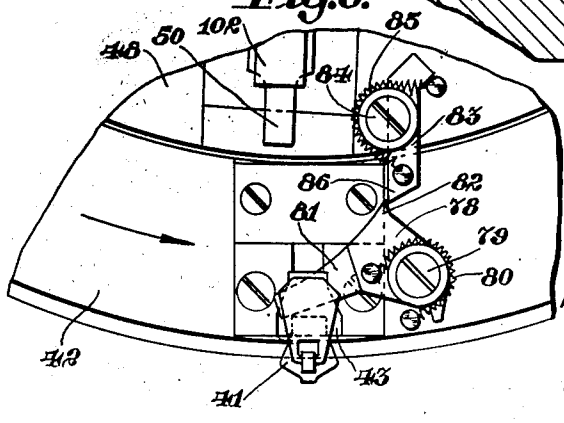


Fig.9.



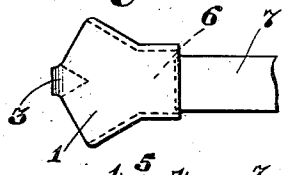
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SLIDER INSPECTING MACHINE

Original Filed April 10, 1935 5 Sheets-Sheet 5

Fig.10.



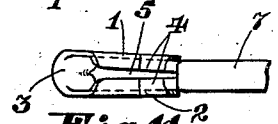


Fig.11.

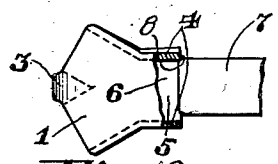


Fig.12.

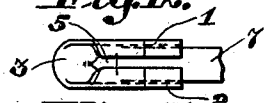
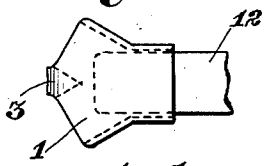


Fig.13.

Fig.14.



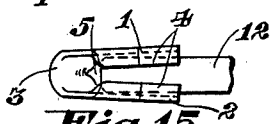


Fig.15.

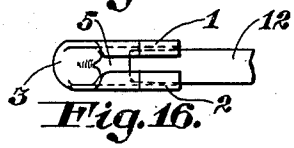
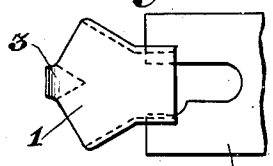


Fig.16.

Fig.17.



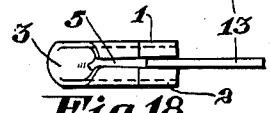


Fig.18.

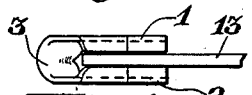


Fig.19.

Fig.20.

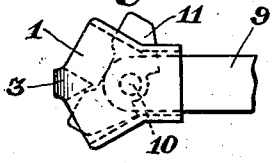


Fig.21.



Fig.22.

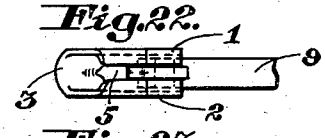


Fig.23.

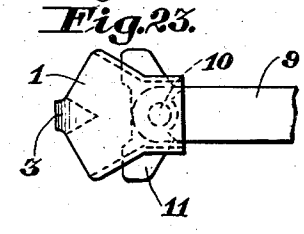


Fig.24.

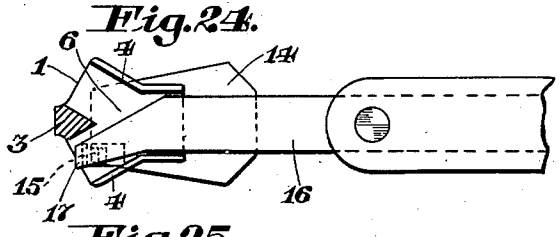


Fig.25.

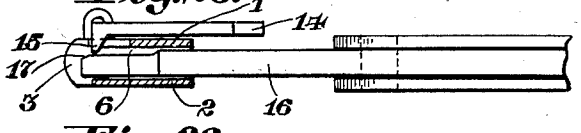
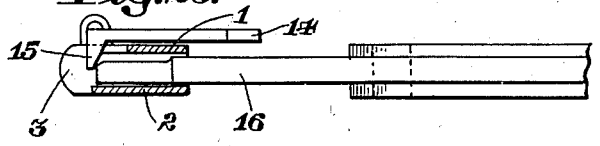


Fig.26.



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UNITED STATES PATENT OFFICE

2,186,693

SLIDER INSPECTING MACHINE

Samuel L. Bradbury, Meadville, Pa., assignor to Talon, Inc., a corporation of Pennsylvania

Application April 10, 1935, Serial No. 15,732
Renewed May 26, 1939

7 Claims. (Cl. 209—82)

This invention relates to an automatic machine for performing various inspecting operations on sliders for slide fasteners.

In the manufacture of such sliders they have to be made in large quantities from sheet metal by various operations including stamping or coining, bending, cutting, trimming, etc. Such a slider usually comprises two wings of generally keystone-shape united at their wider end by a wedge-shaped neck. The wings have inturned flanges which, in conjunction with the neck, define a Y-shaped channel for the guiding of the fastener members. If the two wings of the slider are spaced too close together the slider has a tight fit on the fasteners, and if they are spaced too far apart then there is danger that they will come off the fasteners. It is important therefore that the channel of the slider be accurate in size and shape.

The machine of my invention has for its object to provide mechanism which will automatically perform various inspecting operations on the slider, including one or more of the following: Narrow mouth inspection, wide mouth inspection, crooked mouth inspection, inspection for minimum distance between flanges, inspection for maximum distance between the flanges, and prong length inspection on locking type sliders.

The machine of my invention involves means for automatically feeding sliders successively to a series of inspecting devices or gauges, and means for passing sliders from one station to another. It also involves means for rejecting such sliders as do not pass all inspections, and throwing them out at a different part of the machine from the good sliders.

Preferably the machine involves yielding driving means for preventing relative movement between a slider and an inspection gauge in combination with devices which will cause ejection of the slider if the gauge moves too far as in the case of wide mouth sliders, or not far enough, as in the case of narrow mouth sliders.

In the accompanying drawings I have shown for purposes of illustration, one embodiment which my invention may assume in practice. In these drawings:

Fig. 1 is a plan view of the machine;

Fig. 2 is a vertical cross-section through the machine;

Fig. 3 is an elevation view of the feeding mechanism;

Fig. 4 is a cross-section on line 4—4 of Fig. 3;

Fig. 5 is a detail view showing the holding and ejecting mechanism;

Fig. 6 is a vertical sectional view on an enlarged scale showing the inspecting station for tight sliders;

Fig. 7 is a cross-section showing the inspecting station for the loose mouth sliders;

Fig. 8 is a detail view showing the passing of good sliders by a station;

Fig. 9 is a similar view showing the ejecting of a bad slider;

Figs. 10 and 11 are schcmatic views showing a plan and side view of the tight mouth inspection;

Fig. 12 is a plan view showing the crooked mouth inspection;

Fig. 13 shows the position the gauge should assume in a good slider in a tight mouth inspection;

Figs. 14, 15 and 16 show the wide mouth inspection with Figs. 14 and 15 indicating the relative positions of the gauge, and slider when the slider is bad, and Fig. 16 indicating the relative terminal positions of the slider and gauge when the slider is good;

Figs. 17, 18 and 19 show the minimum flange separation inspection with Figs. 17 and 18 indicating one of several relative positions the slider and gauge may assume for a bad slider, and Fig. 19 indicating the relative terminal positions for a good slider;

Figs. 20 to 23 inclusive show the maximum flange separation inspection with Figs. 20 and 21 indicating one of several relative terminal positions of the gauge and slider, when the slider is bad, and Figs. 22 and 23 showing similar views when the slider is good.

Figs. 24, 25 and 26 are horizontal and vertical sections the horizontal section looking upwardly through the slider at the prong inspection station with Figs. 24 and 25 showing the condition for a bad slider, and Fig. 26 for a good slider.

In Figs. 10 to 26 inclusive, there are shown various samples of a typical slider for slide fasteners. The slider comprises upper and lower wings 1, 2, respectively, connected together at their wide end by a wedge-shaped neck 3. The wings have inturned flanges 4 at their side edges which are spaced apart to leave a slot 5 between them. The interior Y-shaped channel defined by the side flanges and neck 3, is designated here by the numeral 6. If the wings of the slider are too close together, as shown in Fig. 11, the gauge 7 will strike against the edges of the slider instead of entering, as shown in Fig. 13. If the flanges on one wing or the other are distorted, as shown in Fig. 12, to one side, the same gauge 7 will strike against the slider at the point 8 and fail to enter.

In Figs. 20 to 23 inclusive, a gauge bar 9 has

pivoted thereto at 10, a flange gauge 11. The thickness of the flange gauge is such as to resist entering between the flanges any farther than the position shown in Figs. 22 and 23. If the flanges on one side or the other or both sides, are too far apart, as in Figs. 20 and 21, the flange bar is permitted to move farther than normally. In the loose mouth inspection in Figs. 14 to 16 inclusive, a gauge 12 is of such thickness as to permit entering only to the position shown in Fig. 16 unless the mouth is too wide, as shown in Figs. 14 and 15, when the gauge may enter farther than normally.

Figs. 17 and 18 show a gauge 13 with a bifurcated end having a thickness adapted to enter between the flanges of the slider to reject such sliders as have the flanges too close together. If the flanges are too close, as shown in Figs. 17 and 18, the gauge is not permitted to move to the normal position shown in Fig. 19. In Figs. 24 to 26 inclusive there is shown a locking type slider wherein a pull tab 14 has a prong 15 extending into the channel of the slider. A gauge 16 having an inclined end 17 is adapted to pass into the slider and against the prong. If the prong is too short, as shown in Figs. 24 and 25, the gauge is permitted to move farther than the normal position shown in Fig. 26. Thus sliders with prongs which are too short are rejected.

For feeding sliders to the inspecting machine there is employed a suitable mechanical hopper such as shown in Lockie Patent 1,973,720. This mechanism arranges the sliders uniformly and feeds them down an inclined chute 18, see Fig. 3. In cross-section as shown in Fig. 4, this chute is shown to have a narrow supporting blade 19 and the sliders ride down the chute astride this blade. They are kept from coming out of place by the overhanging ledge 20. At the end of the inclined chute is a guideway 21 which has an initial vertical portion, see Fig. 2, and a final curved portion. The endmost slider in the line, see Fig. 3, is received and arrested in this guideway on the end of a bar 111, which is pivoted at 112 and normally kept in position extending into the guideway by the spring 113, and then pushed downward by a vertical reciprocating plunger 22 until it comes to such a position that it can be picked up by the oscillating feed finger 23. This feed mechanism is brought in timed relation to the other parts of the machine. The plunger 22 is normally pushed downwardly by a tension spring 108 but the plunger is intermittently pushed upwardly by a pin 24 rigidly connected to the bracket 25, which carries the plunger 22. The pin 24 has a lost motion connection with the link 26 connected to one end of a bell crank 27. Oscillating movement is imparted to the bell crank from the main drive shaft 28 of the machine through a cam 29, bell crank 30, link 31, and lever 32 which is pivoted at 33 and returned by spring 110. The oscillating finger 23 derives its movement from a link 34 pivoted at 35 to the arm of the machine and connected at 36 to the link 31. The upper end of the link 34 is connected to a link 37 which in turn connects to a crank 38, which carries the feed finger 23. The slider is carried by the feed finger to the end of the curved chute and from that point it is pushed forward by a horizontal reciprocating slide 39, which is operated from the crank 32 by a connection 40.

The slider 41, as seen in Fig. 2, is in one of the several testing positions on the carrier ring 42, which in the example shown, carries eight recesses 43 for receiving the sliders in turn from the feeding mechanism. This carrier ring is supported by the wheel 44 which is journalled on the hollow bearing 45. The wheel is intermittently rotated one-eighth of a revolution by means of a suitable Geneva motion mechanism including the gear 46. The rest of the mechanism is not shown since it forms no part of the present invention. A hollow stationary standard 47 extends upwardly from the bearing 45 and supports a stationary table 48, which in turn carries the various gauges and operating mechanisms for performing the desired inspecting operations, and also other devices which will be described further on.

A typical inspecting mechanism is shown in cross-section in Fig. 6. It comprises reciprocating gauge holder 49, carrying the gauge 50 which is held in place by a quickly removable pin 51. The reciprocating slide is connected at 52 with the bell crank lever 53, which is of special construction to permit a lost motion connection between the arm 54 and the end 52. The arm 54 is connected at 55 between upper and lower rings 56, 57 respectively, to a vertical reciprocating shaft 58. This shaft extends downwardly through the hollow standard 47 and is lifted by a cam 59 on the drive shaft 28. The shaft 58 is returned by tension springs 60 and plate 61, which is guided on studs 62.

Mounted on the carrier ring 42, see Figs. 1 and 5, by means of suitable brackets 63, are the slider retaining devices 64. As seen in Fig. 6 each of these devices comprises a slider engaging member 65, having a hook-like end 66, adapted to engage over a portion of the slider and connected to a vertically movable plunger 67. This plunger is normally held upwardly by a compression spring 68 but throughout the principal path of movement of the slider this plunger is held down by the hook-shaped end 69 of the trigger or lever 70, which engages over a ledge 71 on the plunger. The trigger 70 has an elongated slot 72 engaged over the pin 73 and the upper end is normally pressed inwardly and downwardly by means of a spring 74.

In the position shown in Fig. 2, the trigger 70 is being held upwardly by the inclined stationary cam 75 engaging under the abutment 76 on the trigger. The cam 75 is so located and designated that the trigger lever suddenly drops downwardly when the plunger 67 is directly over a slider. The timing is such that the plunger drops immediately after moving away from the feed station shown in Fig. 2. In order to insure that the trigger 70 will bear inwardly to hold the hook 69 in engagement with the ledge 71, there is provided a spring pressed retaining lever 77 which exerts inward pressure on the trigger as it drops off the cam 75. The trigger spring 74 is sufficiently strong to force the plunger 67 downwardly against the compression of spring 68, as shown in Fig. 6. The plunger thus holds the slider in position firmly until the trigger lever is disengaged from the plunger by one or the other of the devices which will now be described.

At each station on the ring 42 there is mounted an ejector lever 78 pivoted at 79 and normally held in the position shown in Fig. 8 by means of tension spring 80. This lever has the slider engaging arm 81 and a tripping arm 82. At each inspection station on the stationary table 48 is an ejector controlling lever 83 pivoted at 84 and normally held in the position shown in Fig. 9 by the tension spring 85, which is suffi-

& ASSORTING SOLIDS

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Search Room

ciently stronger than the spring 80 that it will force the ejector lever 78 outwardly to the position shown in Fig. 9 when the arm 86 is in contact with the arm 82. It will thus be evident that a slider would be ejected when the lever 78 strikes the lever 83 during the movement of the carrier ring unless the slider were held by the plunger 67. Means are provided for tripping the trigger lever 74 and releasing the plunger 67 at the various inspecting stations provided the slider is defective but if the slider is good, it passes by all inspecting stations.

There are two types of mechanism for operating the various inspection gauges shown in Figs. 10 to 26 inclusive. They are shown in Figs. 6 and 7. The type shown in Fig. 6 operate to trip the trigger lever 70 when the inspecting gauge is not allowed to move far enough, while the type in Fig. 7 trips the trigger lever when the inspecting gauges move too far. In Figs. 6 and 7 the gauge holder is designated by the numeral 49, the gauge being designated by the numeral 50, and the operating lever by the numeral 54, as in Fig. 2. Means are provided for resiliently connecting the arm 54 with the actuating arm 87. Both arms 54 and 87 are pivoted independently about the same center 88. A spring 89 serves to connect an extension 90 on the lever 54 with a portion of the lever 87 at the point 92. Thus when the vertical shaft 58 moves downwardly, the lever 54 will operate the lever 87 through the spring 89 to move the gauge holder and gauge toward the left, as shown in Figs 6 and 7, unless the gauge encounters considerable resistance. This would occur in the narrow mouth inspection if the mouth is too narrow, or if it is crooked, as shown in Fig. 12. It would also occur in the minimum flange separation inspection, shown in Fig. 18. In that event, the arm 87 stops while the arm 54 continues its normal movement. A bell crank lever having arms 93 and 94 is pivotally mounted at 95 on the arm 87. During the continued movement of arm 54 relative to arm 87, the arm 54 engages pin 96 on the bell crank lever forcing it downwardly, thus pulling toward the right link 97. This operates through the lever 98 pivoted at 99 to shift the tripping member 100 to the left, to engage the trip arm 101 of the lever 70. The trigger 70 is thus pivoted about the pin 73 and releases the plunger 67 which immediately springs upwardly. Thus if a slider is bad by reason of a narrow mouth, crooked mouth or flanges too close together, it will be released on the continued movement of the carrier ring and will be ejected by one of the mechanisms which has already been described.

The mechanism shown in Fig. 7 is designed for the inspecting stations which allow the gauge to move too far when the slider is bad, as in the case of the wide mouth in Fig. 15, the wide flange separation in Fig. 21, and the short prong in Fig. 25. The levers 54 and 87 and the lost motion connection, including the spring 89 are of the same design as in Fig. 6. However, instead of the linkage mechanism for operating the trip, the trip member 102 is attached directly to the gauge holder 49. Thus if the gauge 50 encounters no resistance and is allowed to move too far, the trip member 102 will strike the trip arm 101 of the trigger 70. In Fig. 1 seven inspection stations in addition to the feed station have been indicated. However, in any given machine one or more of these may be omitted. I have here described five typical inspections which may be performed by these various stations.

Particular attention is directed to the holding means which permits a small degree of floating or movement of the end of the slider into which the gauge first passes. It will be noted in Fig. 8 that the recess 43 is slightly wider than the width of the slider 41. This permits a limited degree of side pull and permits the slider automatically to align itself with the gauge. Also in some cases the slider may tend to align itself vertically in view of the fact that it is rather lightly spring-held by the holding block 65 bearing on round slider lug as seen in Fig. 6.

Assuming that the slider is good and has passed all of the inspections, it will come to the final station. In order to insure tripping of the trigger 78 after the final inspection a stationary cam member 103 is mounted on the table 48 in the path of the trip arm 101. The retaining plunger then being released, the ejector lever 78 is operated by the permanent abutment 104 to eject all sliders which have passed inspection. An air jet 105 is also provided at this point so as to give further assistance of ejection of all sliders before the feed station is again approached. The air jet is supplied with air from pipe 106 through the hollow standard 47 to the pipe 107 and valve 109.

As a result of my invention it will be apparent that a completely automatic slider inspection machine has been devised which will save an enormous amount of tedious hand work and at the same time, give better assurance of good inspections of all sliders. The bad sliders are separated and classified according to the character of their faults, while the good sliders are carried on and ejected at a separate place.

While I have shown and described in this application one embodiment which my invention may assume in practice, it will be understood that this embodiment is merely for the purposes of illustration and description, and that various other forms may be devised within the scope of my invention as defined in the appended claims.

What I claim as my invention is:

1. An automatic machine for inspecting sliders for slide fasteners, including means for positioning a series of sliders successively in a carrier, releasable means on the carrier for holding said sliders in said carrier, means for intermittently moving said carrier to position said sliders successively at a series of gauging stations, a gauge at each station for inspecting each slider, automatic means for releasing said holding means if the slider is bad and ejecting such sliders from the carrier at each station, and automatic means for releasing said holding means and ejecting good sliders from the carrier after they have been inspected at all of the stations.

2. An automatic machine for inspecting sliders for slide fasteners including means for positioning a series of sliders successively in a carrier, releasable means on the carrier for holding said sliders in said carrier, means for intermittently moving said carrier to position said sliders successively at a series of gauging stations, a gauge mounted at each station, a holder for said gauge adapted to move relative to the slider, said gauge holder adapted to cooperate with the slider holding means to release said slider if the slider is bad, automatic means for ejecting such released sliders from the carrier, and means for releasing said holding means and ejecting good

sliders from the carrier after they have been inspected at all of the stations.

3. An automatic machine for inspecting sliders for slide fasteners, including means for positioning a series of sliders in a carrier, means for holding such sliders in said carrier, means for intermittently moving said carrier to position said sliders successively at a series of gauging stations, a movable gauge and gauge holder at each of said stations, means for yieldingly actuating said gauge holder, releasing means for said slider holding means controlled by said actuating means, means for ejecting bad sliders from the carrier at each station, and means for ejecting all of the good sliders from the carrier after they have been inspected at all of the stations.

4. An automatic machine for inspecting sliders having an interior channel, comprising slider feeding means including a chute and a guideway for successively positioning a series of sliders in a carrier, a carrier, means for holding said sliders in the carrier, a series of inspecting stations, means for intermittently moving said carrier to position each slider successively at each station, a gauge at each station, a gauge holder mounted for movement relative to the slider, means for actuating said gauge holder, means connected to the gauge holder at each station for releasing the slider holding means if the movement of said gauge holder is abnormal, an ejector at each station for ejecting all sliders that are so released, and means for releasing and ejecting all sliders which pass said stations.

5. An automatic machine for inspecting sliders for slide fasteners, said sliders being of the type having parallel wings united at one end by a narrow neck, the wings having flanges at the sides, said wings, flanges and neck defining a Y-shaped channel, which comprises holding devices adapted to grip a slider, a series of gauges, means for successively moving said gauges to said slider, and means for releasing said holding means at each gauging point unless said gauge moves to the proper position, and ejecting means for ejecting the improper sliders at each of the gauging stations.

6. An automatic machine for inspecting sliders for slide fasteners, said sliders having substantially parallel wings with an inturned flange at their edges and spaced apart to form a Y-shaped interior channel, comprising slider feeding means including a chute and a guideway for successively positioning a series of sliders in a rotatable carrier, a carrier, means for holding said sliders in the carrier, a series of gauging stations, means for intermittently moving said carrier to position each slider successively at each station, said gauging stations including a narrow channel gauge, a wide channel gauge, a crooked channel gauge, a minimum distance flange gauge, a maximum distance flange gauge, and a locking device inspecting gauge, a gauge-holder for each gauge mounted for movement relative to the slider, means for actuating said gauge-holders, means actuated by the gauge-holders at each station for releasing the slider holding means if movement of said gauge-holders is abnormal, an ejector at each station for ejecting the released sliders that are defective, and means for releasing and ejecting the sliders from the carrier which are good and pass all the inspecting stations.

7. In a machine for inspecting sliders for slide fasteners, such sliders being of the type having a pair of wings connected at one end by a narrow neck, the wings having inturned flanges at the sides, said flanges being spaced apart throughout their length, a maximum distance gauge flange which comprises the gauge plate 11 adapted to enter between the slider flanges, a gauge operating bar 9 to which the gauge plate is pivoted, said gauge bar being adapted to enter into the slider channel between the two sets of flanges.

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