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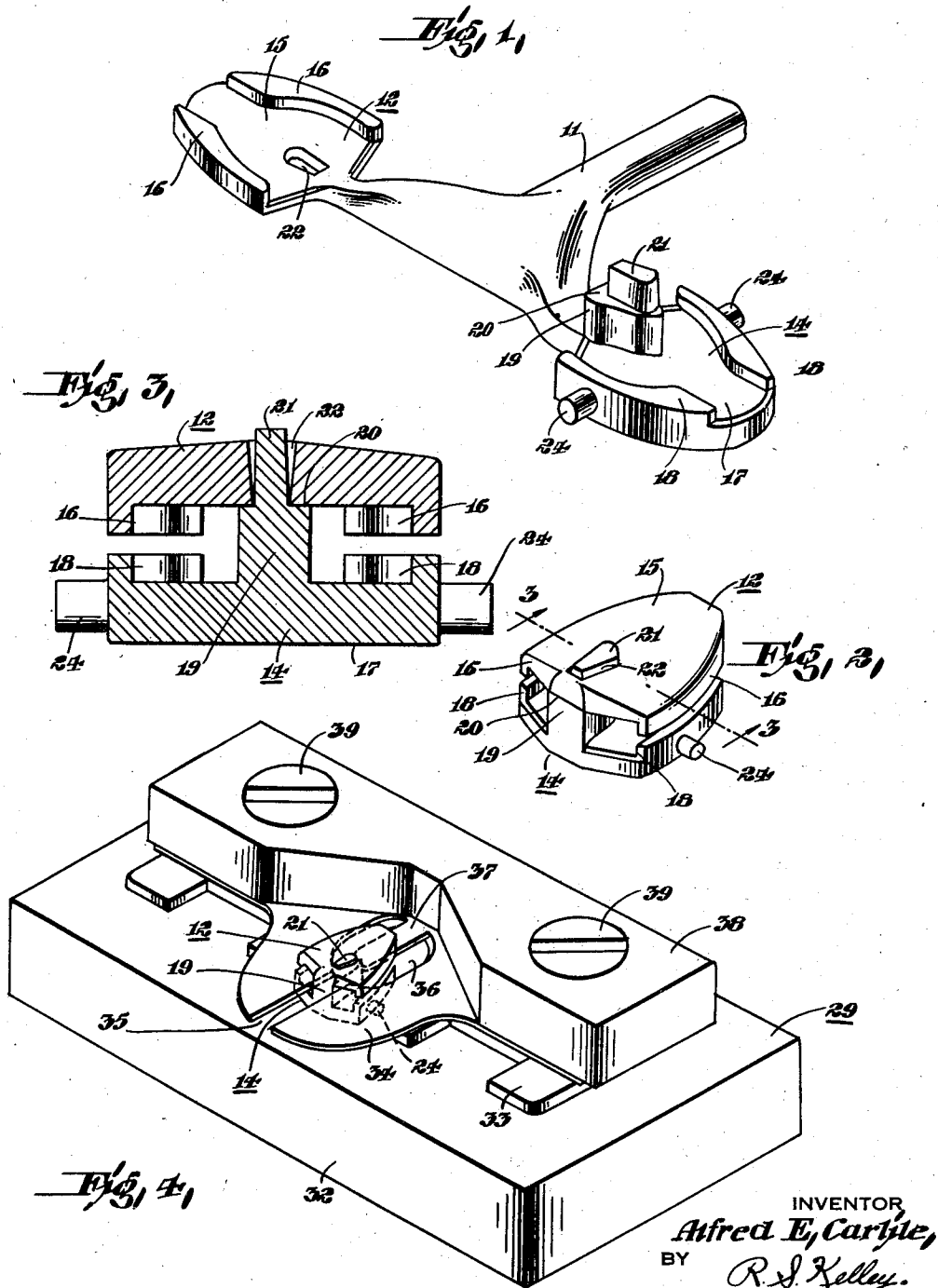
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2,320,566

METHOD OF AND BLANK FOR MAKING SLIDE FASTENERS

Filed Jan. 17, 1941

3 Sheets-Sheet 1



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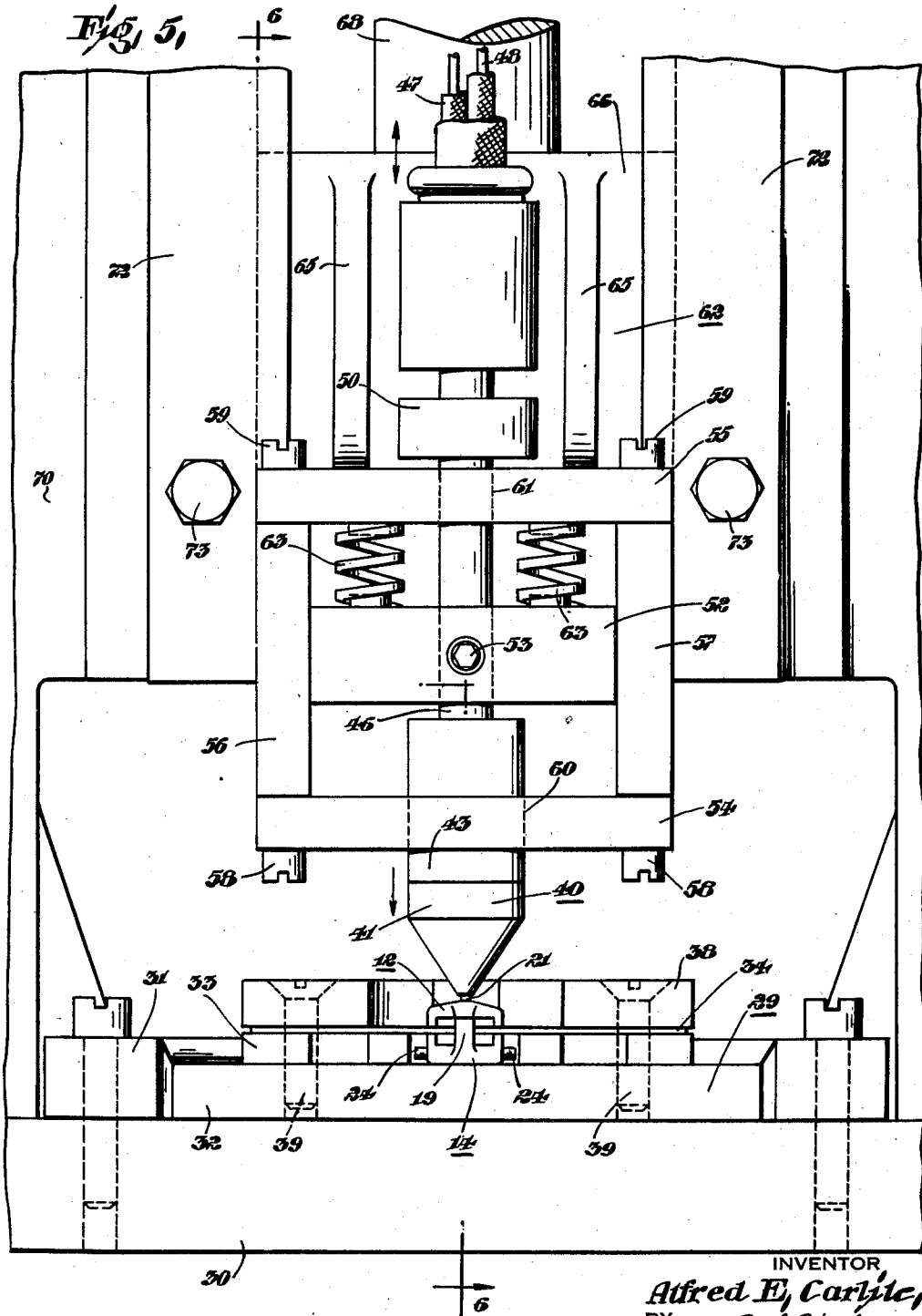
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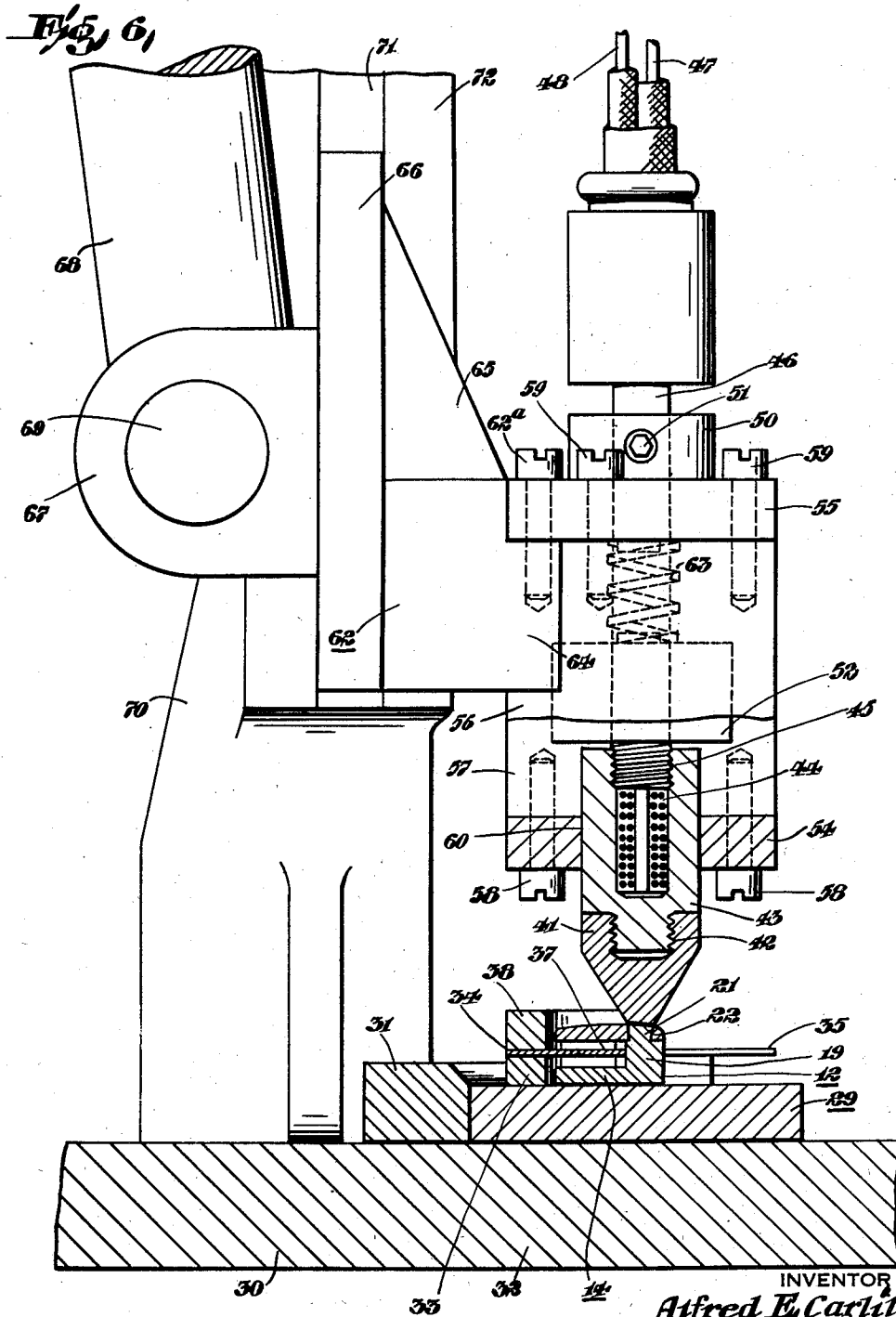
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METHOD OF AND BLANK FOR MAKING SLIDE FASTENERS

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METHOD OF AND BLANK FOR MAKING
SLIDE FASTENERSAlfred E. Carlile, Meadville, Pa., assignor to
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8 Claims. (Cl. 29—148)

This invention relates to slide fastener manufacture and, in particular, to the provision of a new and improved "die cast" slider construction, slider blank, and method for manufacturing "die cast" metallic sliders for slide fasteners.

It is an object of this invention to provide a new and improved method of slide fastener slider manufacture, wherein the slider body is formed in two parts by die casting, and the parts are thereafter rigidly secured together by the application of localized heat and pressure, making possible the use of open, fixed core dies and elimination of complicated multiple-part dies hitherto found necessary in manufacturing die cast sliders, and wherein effective and accurate alignment and spacing of the component parts of the slider are secured concurrently with connection of the parts.

It is a further object of this invention to provide a new and improved "die cast" slider forming blank incorporating one or more die cast "gates", each comprising complementary slider body forming wing members and connecting and supporting sprues.

These and other objects and advantages of the invention will appear from the following description taken in conjunction with the accompanying drawings which form a part thereof, and will be pointed out in the appended claims.

In the drawings:

Fig. 1 is a fragmentary view, in perspective, showing a die cast slider blank formed according to this invention;

Fig. 2 is a view, in perspective, illustrating the assembly of the component parts of the slider body prior to permanent connection thereof;

Fig. 3 is an enlarged section taken substantially on the line 3—3 of Fig. 2;

Fig. 4 is a perspective view showing the support of the assembled parts of the slider body of Fig. 2 on a chuck particularly adapted for its support;

Fig. 5 is a fragmentary view, in front elevation, of slider wing connecting apparatus according to this invention, showing the heating element in heating contact with the slider body at the beginning of its heat and pressure applying operation;

Fig. 6 is a section taken substantially on the line 6—6 of Fig. 5, but showing the heating element in its lowermost, most advanced, position.

Formerly, in manufacturing die cast sliders for slide fasteners, the slider body was formed integrally, in one part, which necessitated the use of complicated multiple part dies with retractable

cores or core parts in order to form the upwardly diverging substantially Y-shaped channel in the slider body. This channel guides the interlocking fastener members of the fastener into and out of interlocking engagement in opening and closing the fastener. Likewise, the use of such die constructions was responsible for the production of uneven and irregular internal slider surfaces, because of the inaccuracies in the movable die parts and/or imperfect fitting thereof. The angles at which these moving cores or parts could be withdrawn likewise limited the internal contours achievable in sliders manufactured by the use of such dies and such die lasting methods.

According to the principles of this invention, all of these disadvantages or prior art slide fastener slider die casting production methods are totally obviated.

In manufacturing die cast sliders for slide fasteners according to this invention, a slider-forming blank, similar to that shown in Fig. 1, is formed by die casting. The blank, or gate, shown in Fig. 1 comprises a sprue 11 connecting and supporting a slider rear wing member 12 and a slider front wing member 14 which are, of course, die cast integrally therewith. A plurality of connected blanks comprising common sprues 11 and wing members 12 and 14 are preferably formed simultaneously in a single die casting "shot" and the disposition of the wing members 12 and 14, shown in Fig. 1, is merely illustrative.

The rear wing member 12 has a plate-like portion 15 with a pair of longitudinally disposed, laterally spaced marginal guide flanges 16 extending from one side of the plate-like portion 15. The side flanges 16 cooperate with similarly spaced and similarly disposed side flanges 18 extending from one side of the plate-like portion 17 of the front wing member 14 to form the outer walls of the upwardly diverging fastener member guide channel of the slider when the wing members 12 and 14 are connected together in predetermined spaced relationship, as hereinafter most fully described and as shown in Figs. 7, 9 and 10.

From Fig. 1 of the drawings, it will clearly appear that the wing members 12 and 14 are capable of being readily formed by the use of die members having fixed or stationary immovable cores. The movable die members may be advanced to engagement with and withdrawn from engagement with complementary stationary die members in straight line movement.

As shown in Fig. 1, the front wing member 14 has the neck or wedge member 19 formed inte-

grally therewith. This neck or wedge member 19 extends from the inner side of the plate-like portion 17 of the front wing member 14 and is of generally wedge-like section, the inclined side surfaces thereof cooperating with the inner surfaces of the flanges 16 and 18 of the wing members 12 and 14 to form the substantially Y-shaped upwardly diverging interlocking fastener member guide channel of the slider.

Extending from the end of the wedge or neck member 19 is a reduced, non-circular, extension or projection 21 which is adapted to fit into the complementary aperture 22 formed in the plate-like portion 15 of the rear wing member 12. The shoulder 20 formed at the junction of the wedge member 19 with the non-circular extension 21 engages the inner surface of the plate-like portion 15 of the wing member 12 adjacent the aperture 22, as shown in Fig. 3, predeterminedly to space the wing members 12 and 14 when they are assembled, as shown in Fig. 3. While the projection or extension 21 is of substantially uniform section throughout, the aperture 22 is tapered or provided with a draft, as shown in Fig. 3, whereby the inner portion of the aperture closely engages the inner portion of the extension or projection 21, while the outer portion of the aperture is spaced substantially therefrom.

After the slider-forming blank is formed by die casting, as shown in Fig. 1, the wing members 12 and 14 are removed from the sprue 11 in suitable manner as by clipping or cutting, and the wing member 12 is assembled to the wing member 14, as shown in Figs. 2 and 3. The projection or extension 21 is then expanded to fit tightly in the aperture 22 in order fixedly to secure the wing members 12 and 14 together in predetermined spaced relationship assured by the cooperation of the shoulder 20 with the inner surface of the portion 15 of the rear wing member 12, as pointed out above. This setting is accomplished by the application of heat and predetermined pressure locally to that portion of the extension or projection 21 which extends outwardly beyond the wing member 12, as shown in Figs. 2, 3 and 4.

As shown in Fig. 1, the front wing member 14 is also provided with bail-supporting trunnions 24 formed integrally therewith during die casting. These trunnions are aligned with one another and extend in opposite directions outwardly from the outer surface of the wing member 14, the axis of the trunnions 24 being disposed substantially transversely thereof. These trunnions 24 are adapted pivotally to support a substantially U-shaped ball member which is provided, at each end, with trunnion engaging apertures adapted to fit over the trunnions 24 when the ball member is sprung into position.

It will thus be seen that, according to this invention, slider-forming blanks comprising sets of rear and front wing members are formed by die casting; the individual wing members are cut out of the die cast gates or blanks and assembled, as shown in Figs. 2 and 3, the projections or extensions 21 being thereafter set, fixedly to secure the wing members together in predetermined spaced relationship. This slider wing connecting or setting operation is followed by assembly of the bail to each slider body.

Particularly adapted to the performance of the above-described slider wing connecting or setting operation is the apparatus shown in Figs. 4, 5 and 6. This comprises broadly a chuck 29 (Fig. 4) particularly adapted to support the as-

sembled complementary slide fastener wing members before they are "set," and heat and pressure applying apparatus including a heating element 40 adapted to act upon the projection or extension 21 permanently to secure the wing members 12 and 14 together. The latter apparatus includes a base 30 having a chuck aligning plate fixed thereon, which chuck aligning plate 31 supports the chuck 29 shown in Fig. 4 in predetermined position in order that the heating element 40 engages the projection 21. The heating element 40 is supported in such manner as to be thrust against the projection or extension 21 with predetermined force whereby it first softens and then compresses the projection or extension 21 so that it completely fills and tightly fits within the aperture 22, as shown in Fig. 2.

In detail, the chuck 29 comprises a base plate 32 which is preferably magnetized and which supports the spacer plate 33. The spacer plate 33 is of irregular shape and is of substantially the same thickness as the combined thickness of the plate-like portion 17 of the front wing member 14 and the flanges 16 thereof. Resting upon this spacer plate 33 is the guide plate 34 having a thickness approximately equal to the distance between adjacent flanges 16 and 18 in the assembled slider. This guide plate is provided with a guide slot 35 having the width thereof substantially equal to the greatest width of the wedge member 19 of the slider. The inner end of the slot is enlarged at 36 and is provided with a plate-like stop member 37 extending from the inner end of the slot in parallelism with the narrow or outer portion of the guide slot 35 and adapted to limit inward movement of the slider by engagement with the inner end portion of the wedge member 19 of the slider when the slider is disposed in the chuck as shown in Fig. 4.

Superposed on the guide plate 34 is the retainer plate 38 which has the central portion thereof cut out to permit free access of the heating element 40 to the extension 21, as shown in Fig. 6. The retainer plate 38, guide plate 34 and spacer plate 33 are secured together and to the base plate 32 by suitable means such as machine screws 39 extending through complementary bores in these members.

The chuck 29, thus, forms a guideway in which the front wing member 14 may be placed either before or after attachment of the rear wing member 12 thereto. When the front wing member 14 is disposed in this guideway, it is restrained against movement both laterally of the guide slot 35 and inwardly longitudinally thereof. The cooperation of the non-circular extension or projection 21 with the complementary aperture 22 of the rear wing member 12 maintains the rear wing member 12 fixed against movement, in like manner.

The heating element 40 comprises a frusto-conical head member 41 screw-threadedly attached at 42 to the lower end of the coil housing 43. This coil housing 43 encloses the heating coil 44 and is screw-threadedly attached at 45 to the tubular extension 46 which encloses the electrical conduits 47 and 48 connecting the heating coil 44 to a conventional source of electric energy, not shown.

Adjustably secured to the upper end of the tubular extension 46, by means of set screw 51, is the stop member 50 which performs a function hereinafter most clearly explained. Also adjustably secured to the tubular extension 46 by means of the set screw 53 is the heating element

carrier member 52 which is disposed adjacent and above the coil housing 43. The carrier member 52 is disposed within a rectangular carrier comprising the bottom plate 54, top plate 55 and side plates 56 and 57. The bottom plate 54 is secured to each of the side plates 56 and 57 by means of four screws 58, and the top plate 55 is secured to the side plates 56 and 57 in like manner by means of four screws 59. The bottom plate 54 is provided with an aperture 60 permitting sliding movement of the coil housing 43 and head 41 of the heating element 40 with respect thereto and an aperture 61 is provided in the top plate 55 permitting like movement of the extension 46 with respect thereto. The top plate 55 is fixedly secured to a vertically reciprocable cross head 62 by means of a pair of screws 62a which are disposed substantially in alignment with the rear-most pair of screws 58, described above. A pair of compression springs 63 is disposed between the top plate 55 and the carrier plate 52 and performs a function hereinafter described in detail. The side plates 56 and 57 are provided with rectangular recesses adapted closely to interfit with the head portion 64 of the crosshead 62, as shown in Fig. 6.

In order to impart strength and rigidity thereto, the crosshead 62 is provided with a pair of laterally spaced vertically disposed strengthening ribs 65, as shown in Figs. 5 and 6. The main or plate-like portion 66 of crosshead 62 is provided at each side with bearing surfaces adapted to guide it in vertical reciprocatory motion. To the rear of the plate-like portion 66 of the crosshead 66 is a connector eye 67, to which the connecting rod 68 is secured by means of the pin 69.

The above-described base 30 of the machine is provided with a standard 70 having therein an opening and a pair of vertical parallel recesses 71, in which the vertical bearing surfaces at the sides of the plate-like body portions 66 are disposed and in which they are retained by means of the retainer plates 72 secured by means of bolts 73 to the standard or upright 70.

Controlled reciprocatory movement is imparted to the crosshead 62 through the connecting rod 68 by conventional means, not shown. Since the rectangular carrier comprising plates 54, 55, 56 and 57 is fixed to the vertically reciprocating crosshead, like motion is also imparted thereto. The carrier member 52 is reciprocable with respect to the above-described rectangular carrier and by means of the above-described pair of spring members 63 disposed between the top plate 55 of the rectangular carrier and the carrier 52, the carrier member 52 is always resiliently urged downwardly in the rectangular carrier. When the crosshead 62 is in its lowermost position, as shown in each of Figs. 5 and 6, the spacing of the parts is such that, upon initial engagement of the heating element 40 with the above-described extension 21 of the slider, the springs 63 are placed under tension, as shown in Fig. 5. The heating element 40 is, of course, always maintained at predetermined temperature and, following this initial contact with the extension 21, the extension is progressively heated. Upon continued heating of the extension 21, it is rendered plastic, whereupon the springs 63 expand and force the heating element carrier member 52 downwardly with respect to the rectangular carrier until this spring-effected movement is limited by engagement of the stop member 50 with the plate 55 of the rectangular carrier, as shown in Fig. 6. The extent of this movement of the heat-

ing element 40 from the position of Fig. 5 to that of Fig. 6 is, of course, controlled by the adjustment of the stop member 50 on the tubular extension 46. The force applied during this movement is likewise adjustable, being controlled by the loading of the springs 63 through adjustment of the heating element carrier member longitudinally with respect to the tubular extension 46.

Thus, in operation, the crosshead 62 continuously reciprocates vertically, carrying with it the rectangular carrier comprising plate members 54, 55, 56 and 57, which is fixed thereto. Between the strokes of the crosshead 62, the loaded chuck 29 is seated within the complementary recess in the chuck aligning plate 31 of the base 30. Toward the lower end of each reciprocation, the heating element 40 engages the extension 21 of the slider in the loaded chuck 29, being yieldingly maintained in contact therewith by the downward thrust of the compressed springs 63 until the metal of the extension 21 is sufficiently softened to permit this yielding force to thrust the head 41 of the heating element 40 from the position of Fig. 5 to that of Fig. 6, whereby the heated, plastic, metal of the extension 21 is compacted within the aperture 22 of the slider fixedly to secure the front wing 14 and rear wing 12 of the slider together and form a one-piece slider body.

After the extension 21 of each slider is heated and expanded or compressed into the aperture 22, as pointed out above, the chuck 29 is removed from the path of the heating element 40 and reloaded and returned thereto or substituted for by another loaded chuck.

From the above description, it will clearly appear that I have provided a new and improved method of manufacturing die cast sliders for slide fasteners, wherein the slider bodies are formed of two parts, thereafter united by the local application of heat and pressure to form a single unitary slider body. It will likewise appear that I have provided a new slider forming blank including at least one pair of complementary slider body forming members adapted for connection by the local application of heat and pressure and that I have provided a new and improved apparatus for the performance of the connecting operation by the local application of heat and pressure.

It is, of course, to be understood that the above description is merely illustrative and in nowise limiting and that I desire to comprehend within my invention such modifications as are included within the scope of the appended claims.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A blank for making die cast sliders for slide fasteners comprising an integral die cast gate including a pair of slider-forming members having complementary connecting means providing permanent connection therebetween when subjected to heat and pressure, said members being connected by an integral severable sprue, and said connecting means comprising an aperture in one slider-forming member and an integral wedge member on the other member having a reduced extension expandable in said aperture upon application of heat and pressure fixedly to secure said slider-forming members in predetermined spaced relation.

2. A blank for making die cast sliders for slide fasteners comprising an integral die cast gate including a pair of slider-forming members connected by an integral severable sprue, one of said members having therein a non-circular outwardly

flaring tapered aperture and the other member having an integral wedge member with a reduced end extremity loosely fitting said aperture and compressible therein substantially completely to fill said aperture and fixedly connect said members together in predetermined spaced relation.

3. A method of making die cast sliders for slide fasteners comprising die casting slider-forming blanks comprising pairs of slider-forming members connected by severable sprues, while forming complementary interengageable connecting means on the members of each pair, severing the sprues from complementary pairs of said slider-forming members, assembling severed pairs of slider-forming members with their connecting means interengaged, and connecting the assembled slider-forming members permanently together by application of heat and pressure locally to said connecting means.

4. A method of making die cast sliders for slide fasteners comprising die casting slider-forming blanks comprising complementary pairs of slider-forming members connected by severable sprues while forming complementary interengageable connecting means on the members of each pair, severing the sprues from said slider-forming members, assembling each pair of slider-forming members with their connecting means interengaged, and fixedly connecting said assembled slider-forming members together by concurrent application of pressure and fusing heat locally to said connecting means.

5. In a method of making die cast sliders for slide fasteners from slider-forming blanks comprising pairs of slider-forming members with complementary interengaging connecting means on the members of each pair, assembling pairs of slider-forming members with their connecting means interengaged, and permanently securing said slider-forming members together by application of heat and pressure locally to said connecting means.

6. In a method of making die cast sliders for slide fasteners, die casting a pair of complementary slider-forming members with integral, complementary connecting means, said means com-

prising an aperture in one slider-forming member and an integral neck on the other slider-forming member having a reduced extension fitting loosely in said aperture, assembling said slider-forming members together with the reduced extension in said aperture, and applying heat and pressure to said reduced extension for rendering it plastic and expanding it firmly in said aperture fixedly to secure said slider-forming members together.

7. In a method of making die cast sliders for slide fasteners, forming a pair of complementary die cast slider-forming members of fusible material with integral complementary connecting means comprising a non-circular tapered aperture in one slider-forming member and an integral neck on the other slider-forming member having a reduced non-circular extension of section corresponding substantially to the smallest portion of said aperture, assembling said slider-forming members together with the reduced extension in said aperture, and applying heat and pressure to said reduced extension for rendering it plastic and expanding it firmly in said aperture fixedly to secure said slider-forming members together.

8. In a method of making die cast sliders for slide fasteners, forming a pair of complementary slider-forming members with integral complementary connecting means, said means comprising a non-circular outwardly flared aperture in one slider-forming member and an integral neck on the other slider-forming member having a reduced non-circular extension of section corresponding substantially to the smallest portion of said aperture and longer than said aperture, assembling said slider-forming members together with the reduced extension extending through and beyond said aperture, and applying fusing heat and yielding pressure to said reduced extension beyond said aperture for rendering it plastic and thereafter packing it firmly in said aperture while plastic, fixedly to secure said slider-forming members together.

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