

Jan. 24, 1950

P. NATZLER ET AL

2,495,539

MOLD FOR SLIDE FASTENER SLIDERS

Filed April 16, 1946

3 Sheets-Sheet 1

FIG. 1

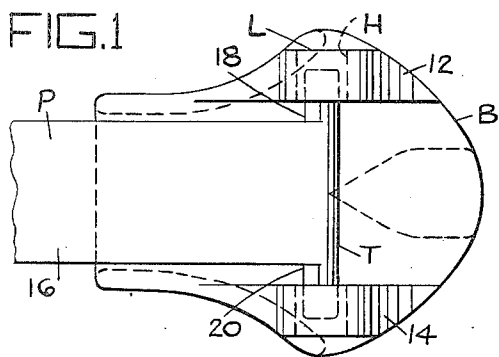


FIG. 2

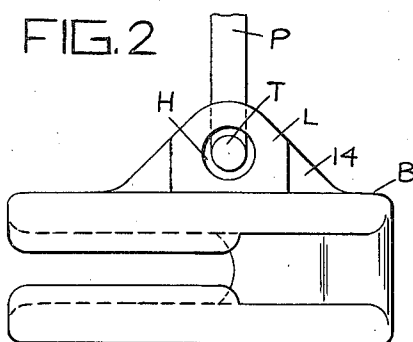
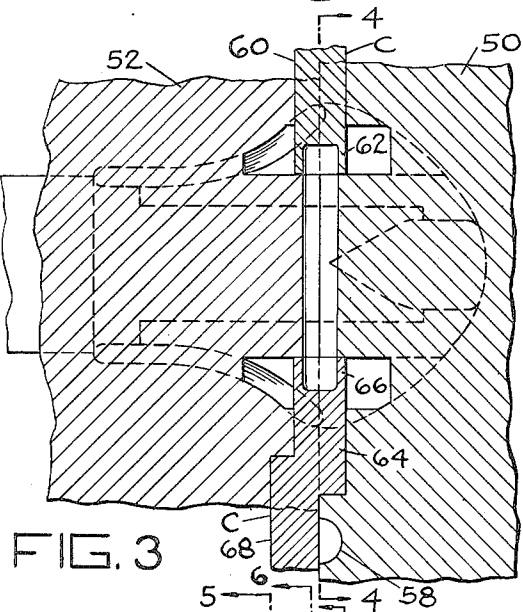
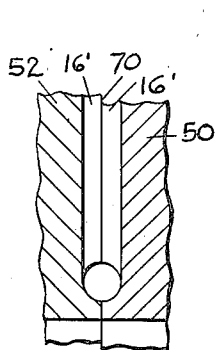


FIG. 5

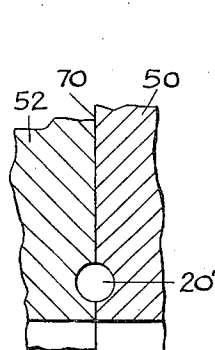


FIG. 6

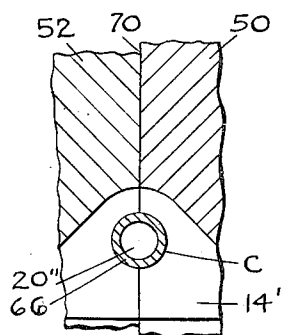


FIG. 7

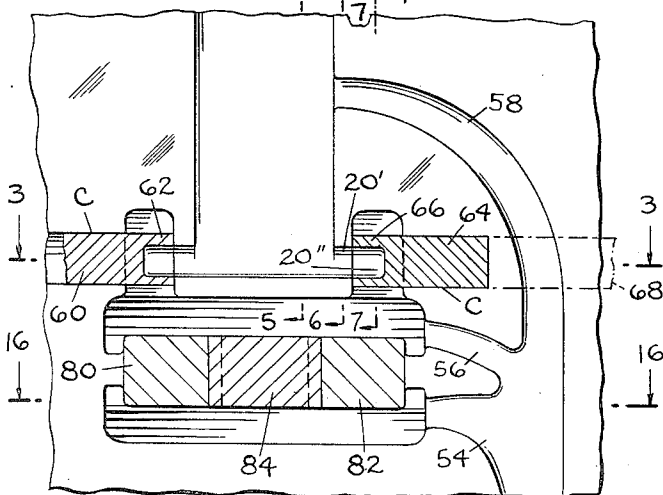


FIG. 4

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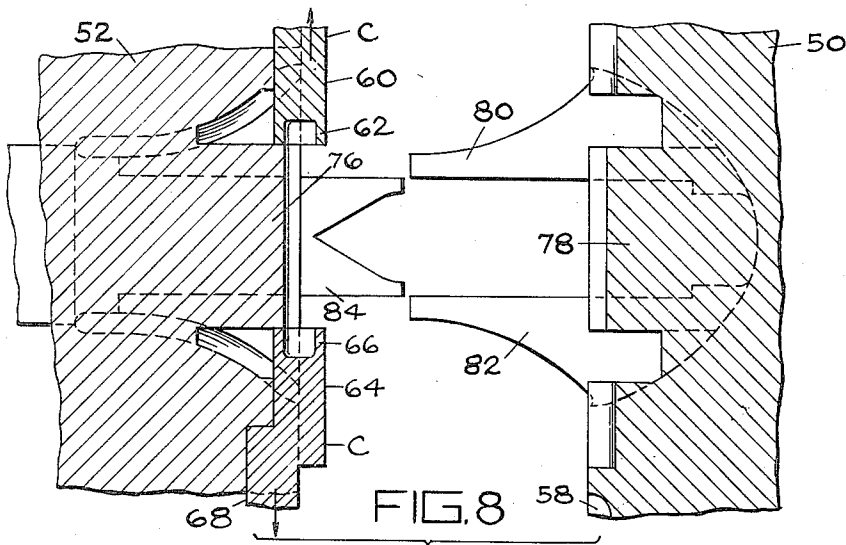
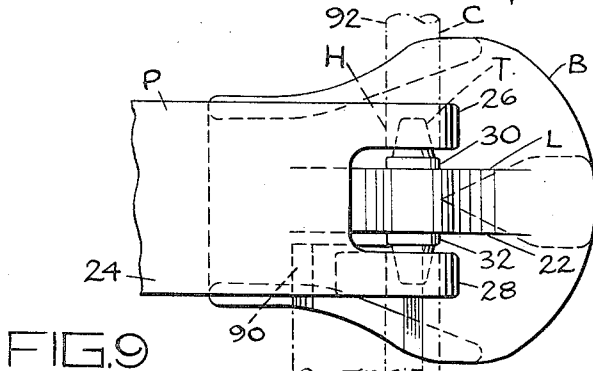


FIG. 9

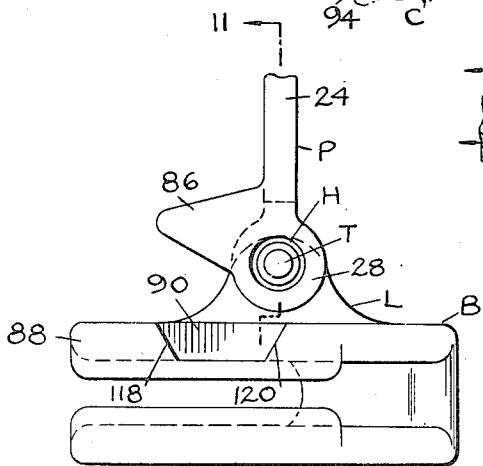


FIG. 10

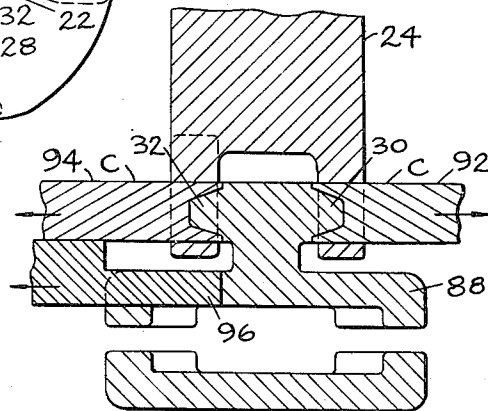


FIG. 11

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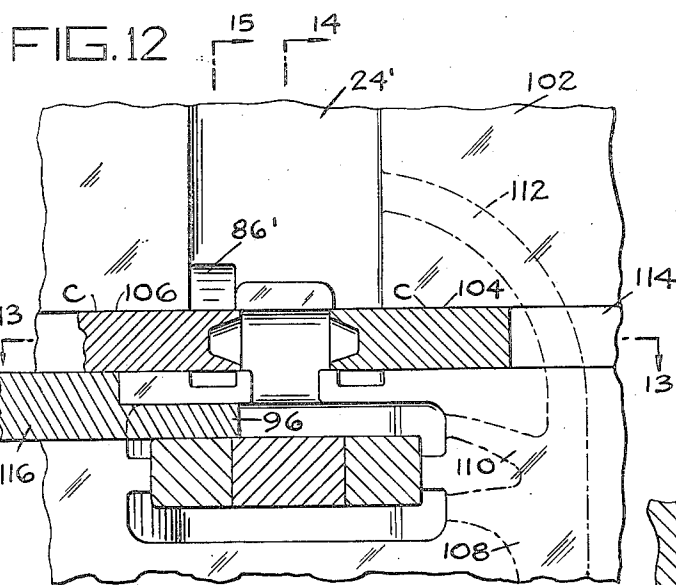
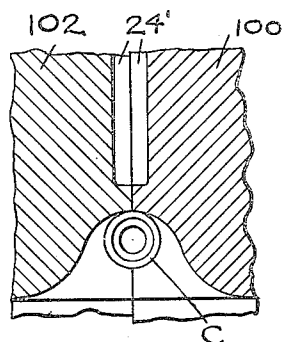


FIG. 14

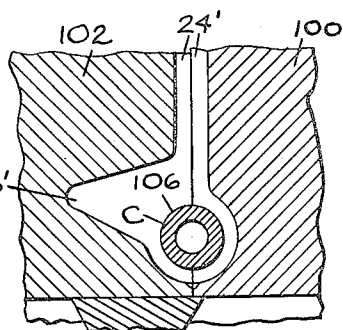


FIG. 15

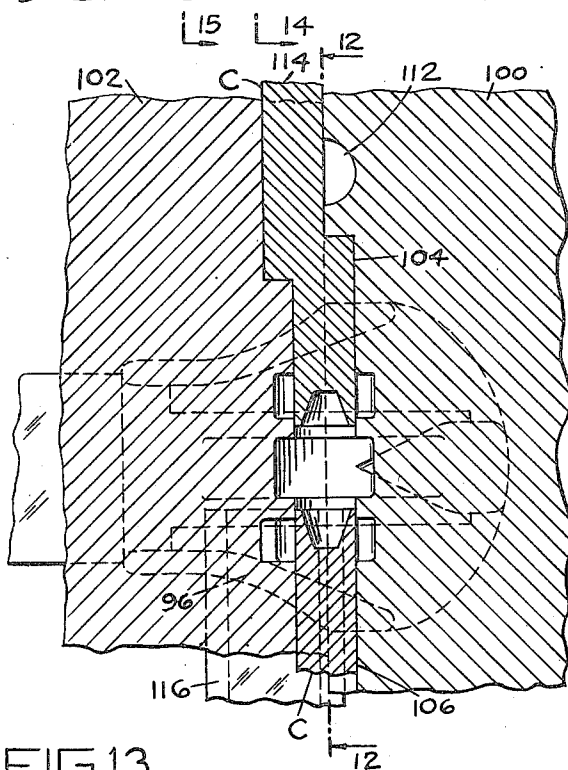


FIG. 13

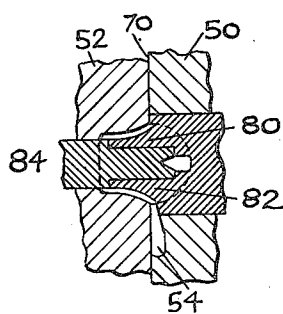


FIG. 16

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2,495,539

MOLD FOR SLIDE FASTENER SLIDERS

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Application April 16, 1946, Serial No. 662,568

15 Claims. (Cl. 18—42)

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This invention relates to sliders for slide fasteners, and more particularly to apparatus for molding or die-casting the same.

A slider of the usual type comprises a slider body and a pull tab or "pull" pivotally mounted thereon. The slider body and the pull are made separately and later joined. This requires bending of the parts, if of metal, and bending and cementing if of plastic. The present invention does away with these assembly operations, and provides a mold which furnishes a joined slider and pull. Other methods of accomplishing this are disclosed in our companion applications Serial Nos. 646,102 and 646,103, both filed February 7, 1946.

One object of the present invention is to simplify the aforesaid methods. Another object is to provide apparatus for molding in one operation, a slider and pull which are joined by round trunnions received in round holes. Still another object is to provide apparatus which will thus mold a pinlock type slider.

To accomplish the foregoing objects, and others which will hereinafter appear, our invention resides in the mold and slider elements, and their relation one to the other, as are more particularly described in the following specification and sought to be defined in the appended claims. The specification is accompanied by drawings, in which:

Fig. 1 is a plan view of a slider made in accordance with the present invention;

Fig. 2 is a side elevation thereof, with the pull in erect position;

Fig. 3 is a horizontal section through a portion of a die for molding the slider of Figs. 1 and 2, this section being taken approximately in the plane of the line 3—3 of Fig. 4;

Fig. 4 is a vertical section taken in the parting plane, looking toward the cover die, this section being in the plane of the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary vertical section taken approximately in the plane of the line 5—5 of Fig. 4;

Fig. 6 is a fragmentary vertical section taken approximately in the plane of the line 6—6 of Fig. 4;

Fig. 7 is a fragmentary vertical section taken approximately in the plane of the line 7—7 of Fig. 4;

Fig. 8 is a horizontal section similar to Fig. 3, but showing the die partially opened;

Fig. 9 is a plan view of a modified slider made in accordance with our invention;

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Fig. 10 is a side elevation with the pull in erect position;

Fig. 11 is a schematic section taken through the slider approximately in the plane of the line 11—11 of Fig. 10, and showing the retractible cores of the mold in their relation to the slider;

Fig. 12 is a vertical section through the mold for the slider of Figs. 9 and 10, taken on the parting face, looking toward the ejector die, in the plane of the line 12—12 of Fig. 13;

Fig. 13 is a horizontal section through the retractible cores which form the trunnions, and is taken approximately in the plane of the line 13—13 of Fig. 12;

Fig. 14 is a fragmentary vertical section taken approximately in the plane of the line 14—14 of Fig. 12;

Fig. 15 is a fragmentary vertical section taken approximately in the plane of the line 15—15 of Fig. 12; and

Fig. 16 is a horizontal schematic section drawn to reduced scale through the body portion and neck of the slider cavity, or approximately in the plane of the line 16—16 of Fig. 4.

Referring to the drawings, and more particularly to Figs. 1, 2, 9 and 10, the sliders there shown comprise a slider body B having a lug L and a pull P, the pull being pivotally joined to the lug by means of a trunnion T on one of said parts projecting into a hole H in the other of said parts. In the first form of slider shown in Figs. 1 and 2, the slider has a pair of spaced lugs 12 and 14, with the pull 16 disposed between the lugs. The pull has trunnions 18 and 20 which project outwardly into holes in the lugs 12 and 14. In the second form of slider shown in Figs. 9 and 10, the slider has a single lug 22, and the pull 24 has spaced arms 26 and 28 which straddle the lug 22. In this case the trunnions 30 and 32 are molded integrally with the lug 22, and project outwardly into holes in the arms 26 and 28 of the pull. In both forms the center line of the trunnions lies athwart the widest part of the slider body.

In accordance with the generic features of the invention, the mold in all cases has appropriate mold cavities to form the slider body, lug and pull, and further includes a core C (Figs. 3, 4, 7, 8, and 11—15) on the axis of the trunnion, the end of the core being cup-shaped with an annular wall having an outside diameter selected to form the hole, and an inside diameter selected to form the trunnion, the annular wall at the end of the core providing clearance between the trunnion and the hole. In the first form of the invention, the cores

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pass through the spaced lugs, as is shown in Figs. 3 and 4. In the second form of the invention, the cores pass through the spaced arms of the pull, as is shown in Figs. 9, 11, and 12.

While not essential to the present invention when considered in its broadest form, we find it highly advantageous to mold the slider body and the pull in a mold which is separable on a parting face extending transversely of the longitudinal axis of the slider, at the widest part of the slider. The mold has appropriate cavities to form the slider body, lug and pull, with the pull lying in the parting plane of the mold. The slider body itself is formed while using only fixed cores for the Y-shaped channel, as shown in Fig. 16. This feature is disclosed and claimed in a co-pending application of Frederick Ulrich, Serial No. 512,898, filed December 4, 1943, now Patent No. 2,415,395.

In the present case, the retractible cores C lie not only on the axis of the trunnions, but also in the parting plane of the mold. This has advantages which will appear later. It is for this reason that the sliders are so designed that the trunnions lie athwart the slider at its widest dimension.

Referring now to Figs. 3 through 8, and considering the invention in greater detail, the die portion 50 is the cover die, and the portion 52 is the ejector die. Cover die 50 remains stationary, and includes on its parting face the feed passages or gates 54, 56 and 58, best shown in Fig. 4. The ejector die 52 moves away from the cover die, as is best shown in Fig. 8, and the cores C move with the ejector die. The core 60 is a simple, cylindrical core disposed in the parting plane. The end is cup-shaped, having an annular wall 62, the outside diameter of which forms the hole through lug 12 (Fig. 1) of the slider, and the inside of which forms the end of the trunnion 18 (Fig. 1).

The inner portion 64 of the other core (Fig. 3) is also cylindrical, with a cup-shaped end including an annular wall 66, all as previously described, but the outer portion of the core is offset, as shown at 68, and is disposed at one side of the parting plane. This is done in order to clear the gate passage 58 previously referred to, as is best shown in Figs. 3 and 4. The part 68 of the core is shown in broken lines in Fig. 4 because it is really in the ejector die, whereas in Fig. 4 one looks at the cover die. The core 64, 62 can be pulled outwardly to clear the trunnions, despite the offset, because the die is opened before the cores are retracted. By referring to Fig. 8, in which the ejector die 52 has been separated from the cover die 50, it will be clear that both cores may be pulled outwardly without interference. Core 68 can begin to retract after the die opens a little. Thus the cores may retract as the die opens, rather than after the die has completely opened.

The pull is molded in the erect position shown in Fig. 2. It lies in the parting plane of the mold, and a vertical section through the die across the pull will take the appearance shown in Fig. 5, the pull 16 being formed in mating cavities 16' on opposite sides of the parting plane 70. If a similar section is taken through the trunnion between the pull and the lug supporting the pull, the section will look as in Fig. 6, the trunnion being formed in cavity 20' corresponding to trunnion 20. If, however, a section is taken through the lug, it will appear as in Fig. 7, the cavity 14' serving to form the lug 14, and the cup cavity

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20" serving to form the outer end of the trunnion 20.

In Fig. 8, it will be seen that the inside walls of the lugs are defined by fixed cores 76 and 78 forming a part of the mold. These cores come together at the parting plane to define the rounded end of the pull, between the pull and the top wall of the slider body.

The interior or Y-shaped channel of the slider body is also formed by means of fixed cores. The general idea is best shown in Fig. 16, in which cover die 50 has spaced cores 80 and 82 projecting through the die cavity beyond the parting plane 70 into the opposite cavity, while ejector die 52 has a core 84 which projects through the cavity beyond the parting plane into the opposite cavity. These cores, although for convenience made of separate pieces of metal as shown, are locked in the die so that cores 80 and 82 remain stationary with the cover die 50, while core 84 moves with ejector die 52. The cores 80, 82, and 84 are shown in partially separated condition in Fig. 8. The cores fit together, as shown in Fig. 16, to form a single core which defines the interior of the slider, but the neck of the slider is cast between the base portions of the cores 80 and 82 and the end of core 84. The nested relation of the cores 80, 82, and 84 is shown in Fig. 4, and is indicated in dotted lines in Fig. 3.

Considering the second form of the invention in greater detail, and referring first to Figs. 9 and 10, the slider there shown has spaced pull arms 26 and 28 straddling a single slider lug 22. This may be done merely as a variation of the construction previously described, but in the present case is done for a more significant reason, namely to facilitate incorporation of a locking pin on the pull, or in other words, to make a so-called "pin lock" type of slider. In Fig. 10 the pin or tooth 86 is clearly exposed because the pull 24 is in erect position. The upper wing 88 of the slider has an opening or passage 90 through which the locking pin 86 passes when the pull 24 is turned down to the flat position shown in Fig. 9. The pin 86 is so designed and dimensioned as to fit between the spaced elements of one stringer of the fastener, at the tape, thereby locking the slider against opening movement. Such a pin cannot be located at the center, where the elements of both stringers overlap and mesh together.

Referring now to Fig. 11, the trunnions 30 and 32 are formed by the cup-shaped ends of cores 92 and 94, while the opening 90 through the upper slider wing 88 is formed by a retractible core 96. Although the desired opening passes vertically through the slider wing, it is convenient to form the same by means of a horizontally moving core 96 passing through the edge of the wing, and it will be understood that by making the core 96 at least as thick as the wing, the result will be a passage through the wing.

The mold itself is best shown in Figs. 12 through 15 of the drawing. The pull 24 is formed in cavities 24' lying in the parting plane of the mold. The die portion 100 is preferably the cover die, and portion 102 and ejector die. The cores 104, 106 lie in the parting plane, and move with the ejector die 102 when the die opens. These cores have cup-shaped ends the annular walls of which define both the holes through the pull, and the trunnions on the lug. In the present case, the trunnions are tapered, being given a frusto-conical configuration instead of the nearly cylindrical configuration previously shown. Either

shape may be used with either slider, and even when a cylindrical shape is referred to it will be understood that in die casting practice some taper is always used to facilitate retraction of a core.

As before, the molten metal is supplied to the die cavities by means of gates 108 (Fig. 12), 110, and 112. These are shown in broken lines in Fig. 12, because they are actually formed in the cover die, whereas Fig. 12 shows the ejector die. The outer portion of the core 104 is offset, as shown at 114 in Fig. 13, in order to clear the gate passage 112. Here again it will be understood that while core 114 cannot be retracted with the mold in the closed position shown in Fig. 13, it can be retracted when the die is open, or soon after the die begins to open.

The molding of the locking pin 86 presents no problem, when the pull is molded in erect position as here shown, it being molded directly on the pull by means of a cavity 86' best shown in Fig. 15, but also visible in Fig. 12. The section of Fig. 15 also passes through the cup-shaped end of the core 106.

The core 96 which forms the opening or passage for the lock pin is shown in Figs. 12 and 13. The outer part 116 of this core is preferably thickened in order to strengthen the same, for the core is of slender section at its working end. Because of the arcuate path taken by the locking tooth, the walls of the passage 90 may converge, as is best shown at 118 and 120 in Fig. 10. The edges of the core are correspondingly tapered, this being indicated by the broken lines in Fig. 13 which show that the bottom face of the core is not as wide as the top face of the core.

It is believed that our improved apparatus for molding sliders, as well as the advantages thereof, will be apparent from the foregoing detailed description. The slider and pull are molded in a single operation, and are joined by round trunnions received in round holes, with desired clearance therebetween. The pull may be disposed between spaced lugs on the slider, or may be received around a single lug. If desired, a slider of the pin-lock type may be molded.

While we have shown the stepped core so arranged that the mold must begin to open before the core is retracted, it will be understood that a clearance may be provided in the mold in back of the step in core, so that the core can be retracted while the mold is still closed.

The slider has a continuous top wall beneath the lugs, and the bearing holes are continuous round bearings, in contrast with slides in which lugs are struck up from the slider body, or are initially open bearings which are later closed.

It will be apparent that while we have shown and described our invention in preferred forms, changes may be made in the structures disclosed, without departing from the spirit of the invention as sought to be defined in the following claims.

In the appended claims, use of the word "diameter" in connection with the annular wall at the end of the core is not intended to imply a cylindrical shape, in contrast with a tapered shape.

We claim:

1. A mold for molding a slider having a lug and a pull pivotally joined to said lug by means of a trunnion on one of said parts projecting into a hole in the other of said parts, said mold having appropriate mold cavities to form the slider body, lug, and pull, and a core axially slidably mounted in said mold on the axis of the trunnion, to help form the lug and pull the end of said core being movable into one of said cavities

and being cup-shaped with an annular wall having an outside diameter selected to form the aforesaid hole and an inside diameter selected to form the aforesaid trunnion, said annular wall providing clearance between the trunnion and the hole.

2. A mold for molding a slider having a lug and a pull pivotally joined to said lug by means of a trunnion on one of said parts projecting into a hole in the other of said parts, said mold being separable on a parting face transverse of the longitudinal axis of the slider at the widest part of the slider and having appropriate mold cavities to form the slider body, lug, and pull, with the pull lying in the parting plane of the mold, and a retractible core slidably mounted in said mold with the working end of the core in the parting face of the mold and on the axis of the trunnion to help form the lug and pull, the end of said core being movable into one of said cavities and being cup-shaped with an annular wall having an outside diameter selected to form the aforesaid hole and an inside diameter selected to form the aforesaid trunnion.

3. A mold as defined in claim 2, in which gate passages are formed in the parting plane and lead to the upper wing of the slider and to the pull, and in which the core is offset at the gate passage extending between the upper wing and the pull, in order that said gate passage may lie in the parting plane.

4. A mold for molding a slider having a pair of spaced lugs and a pull disposed between said lugs and pivotally joined to said lugs by means of trunnions on the pull projecting into holes in the lugs, said mold having appropriate mold cavities to form the slider body, lugs, and pull, and a pair of aligned cores on the axis of the trunnions, the ends of said cores being cup-shaped with annular walls having an outside diameter selected to form the aforesaid holes in the lugs, and an inside diameter selected to form the aforesaid trunnions on the pull, said annular walls at the ends of the cores providing clearance between the trunnions and the holes.

5. A mold for molding a slider having a pair of spaced lugs and a pull disposed between said lugs and pivotally joined to said lugs by means of trunnions on the pull projecting into holes in the lugs, said mold being separable on a parting face transverse of the longitudinal axis of the slider at the widest part of the slider and having appropriate mold cavities to form the slider body, lugs, and pull with the pull lying in the parting plane of the mold, and a pair of aligned oppositely retractible cores movable on the axis of the trunnions, the ends of said cores being cup-shaped with annular walls having an outside diameter selected to form the aforesaid holes in the lugs, and an inside diameter selected to form the aforesaid trunnions on the pull.

6. A mold as defined in claim 5, in which gate passages are formed in the parting plane and lead to the lower wing of the slider, the upper wing of the slider, and the pull, and in which the core on the side of the slider having the gate passages is offset at the gate passage extending between the upper wing and the pull, in order that said gate passage may lie in the parting plane of the mold.

7. A mold for molding a slider having a lug and a pull straddling said lug and pivotally joined to said lug by means of trunnions on said lug projecting into holes in said pull, said mold having appropriate mold cavities to form the slider body,

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lug, and pull, and a pair of aligned cores on the axis of the trunnions, the ends of said cores being cup-shaped with annular walls having an outside diameter selected to form the aforesaid holes in the pull, and an inside diameter selected to form the aforesaid trunnions on the sides of said lug, said annular walls at the ends of the cores providing clearance between the trunnions and the holes.

8. A mold as defined in claim 7, in which a cavity is provided for forming a locking pin on said pull, and in which an additional core is provided projecting into the upper wing of the slider body in such a way as to form an opening through which the aforesaid locking pin may be turned down into the slider channel.

9. A mold for molding a slider having a lug and a pull straddling said lug and pivotally joined to said lug by means of trunnions on said lug projecting into holes in said pull, said mold being separable on a parting face transverse of the longitudinal axis of the slider at the widest part of the slider and having appropriate mold cavities to form the slider body, lug, and pull with the pull lying in the parting plane of the mold, and a pair of aligned oppositely retractible cores movable on the axis of the trunnions, the ends of said cores being cup-shaped with annular walls having an outside diameter selected to form the aforesaid holes in the pull and an inside diameter selected to form the aforesaid trunnions on the sides of said lug.

10. A mold as defined in claim 9, in which a cavity is provided for forming a locking pin on said pull near one of said trunnions, and in which an additional core is provided movable in the same direction as the aforesaid cores but projecting into the side of the upper wing of the slider body in such a way as to form an opening in the upper wing through which the aforesaid locking pin may be turned down into the slider channel when the pull is turned from its operating position to its rest position.

11. A mold as defined in claim 9, in which gate passages are formed in the parting plane and lead to the upper wing of the slider and to the pull, and in which the core on the side of the slider having the gate passages is offset at the gate passage extending between the upper wing and the pull, in order that said gate passage may lie in the parting plane of the mold.

12. A mold for molding two parts inseparably pivotally joined by means of a trunnion on one of said parts projecting into a hole in the other of said parts, said mold having appropriate mold cavities to form the parts, and a core axially slid-

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ably mounted in said mold on the axis of the trunnion to help form the parts, the end of said core being movable into one of said cavities and being cup-shaped with an annular wall having an outside diameter selected to form the aforesaid hole and an inside diameter selected to form the aforesaid trunnion, said annular wall providing clearance between the trunnion and the hole.

13. A diecast metal slider for a slide fastener, said slider comprising a diecast slider body having projecting means integral therewith and diecast pull means pivotally joined to said projecting means by a pair of diecast trunnions on one of said means formed integrally therewith, said trunnions projecting outwardly into a pair of bearing holes cast in alignment through the other of said means, said bearing holes each providing a continuous, unbroken surface for journalling the trunnions.

14. A diecast metal slider for a slide fastener, said slider comprising a diecast slider body having a pair of spaced lugs integral therewith with aligned bearing holes cast therethrough and a diecast pull disposed between said lugs and pivotally joined to said lugs by means of integral diecast trunnions on the pull projecting outwardly into said bearing holes, said bearing holes each providing a continuous, unbroken surface for journalling the trunnions.

15. A diecast metal slider for a slide fastener, said slider comprising a diecast slider body having an integral lug and a diecast pull having integral arms with aligned bearing holes cast therethrough straddling said lug and pivotally joined to said lug by means of integral diecast trunnions on said lug projecting outwardly into said bearing holes, said bearing holes each providing a continuous, unbroken surface for journalling the trunnions.

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