Jan. 9, 1962 E. J. HERBST 3,016,033

SHUTTLE MECHANISMS FOR SEWING MACHINES

Filed Jan. 9, 1958 2 Sheets-Sheet 1

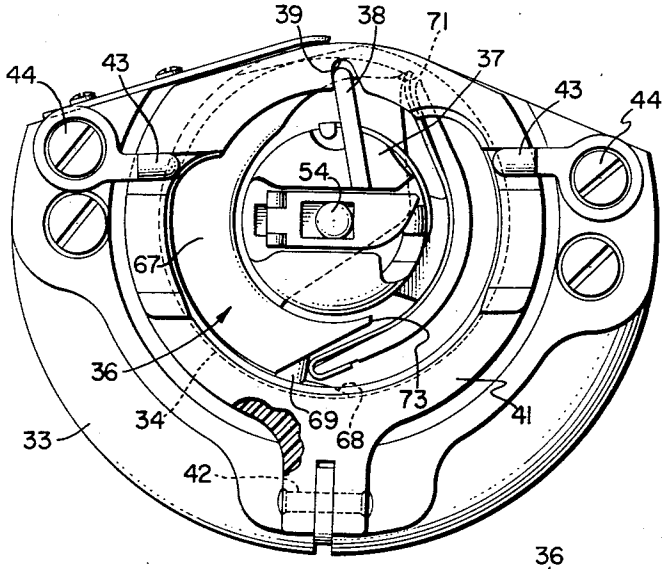


Fig. 3.

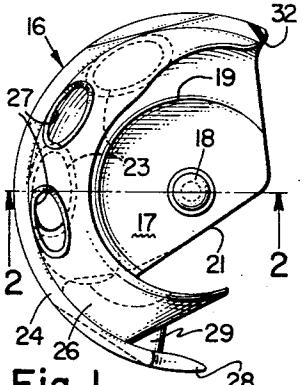


Fig. 1. (Prior Art)

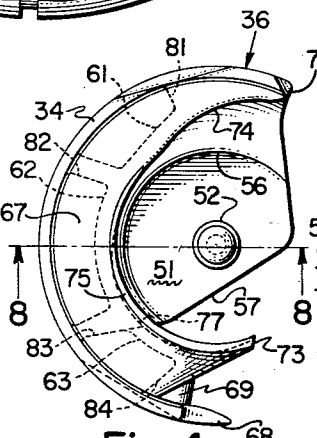


Fig. 4.

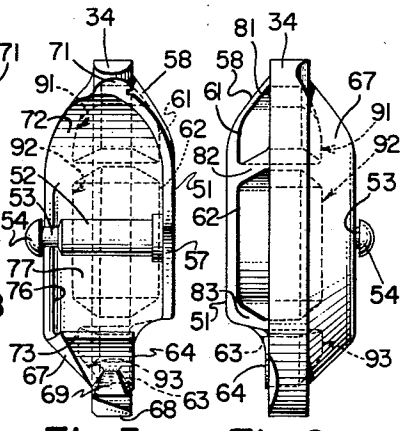


Fig. 5. Fig. 6.

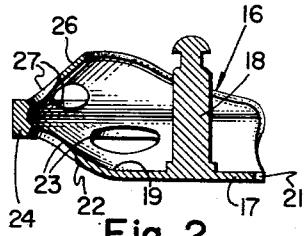


Fig. 2. (Prior Art)

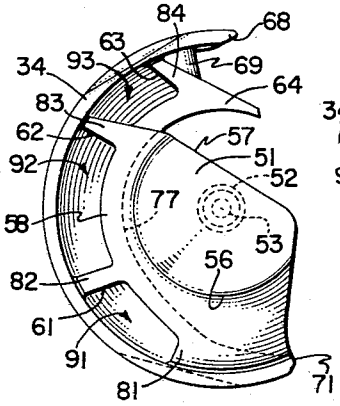


Fig. 7.

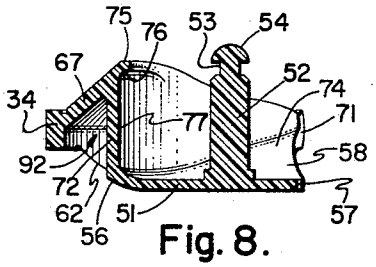


Fig. 8.

INVENTOR.
Edward J. Herbst

WITNESS
Nicholas Leszczak

BY
Marshall J. Breen
ATTORNEY

SHUTTLE MECHANISMS FOR SEWING MACHINES

Filed Jan. 9, 1958 2 Sheets-Sheet 2

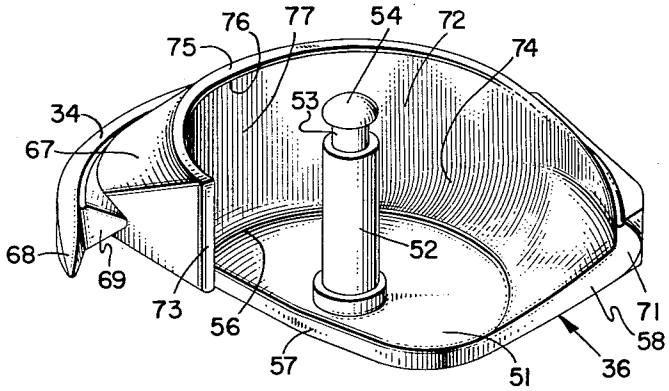


Fig. 9.

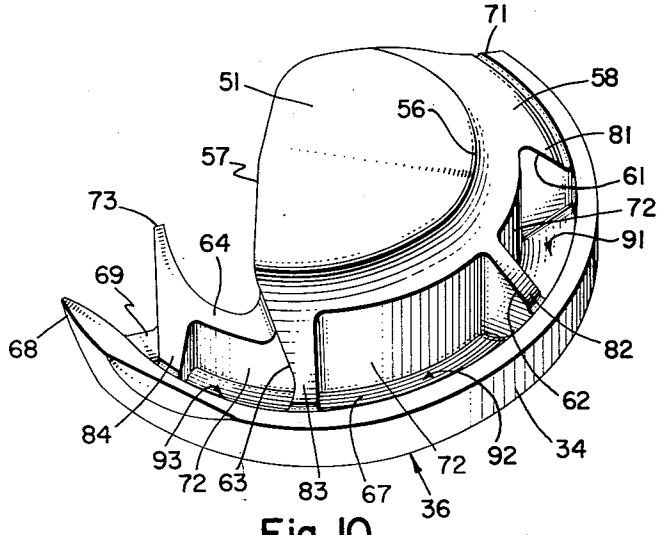


Fig. 10.

INVENTOR.
Edward J. Herbst

WITNESS
Nicholas Leszczak

BY
Marshall J. Breen
ATTORNEY

United States Patent Office 3,016,033 Patented Jan. 9, 1962

3,016,033

SHUTTLE MECHANISMS FOR SEWING MACHINES

Edward J. Herbst, South Plainfield, N.J., assignor to The Singer Manufacturing Company, Elizabeth, N.J., a corporation of New Jersey

Filed Jan. 9, 1958, Ser. No. 707,932
9 Claims. (Cl. 112—232)

This invention relates to shuttle mechanisms for sewing machines and more particularly to an improved sewing machine shuttle body fabricated, molded, or cast from plastic, metal, or other suitable material, and the primary object of the present invention is to provide an improved device of this character.

Another object of the invention is to provide an improved shuttle body that is especially adapted for use with an oscillatory type shuttle sewing machine, the said shuttle body being so constructed and arranged that it can be cast or molded from light weight material and thereby have low inertia when starting, stopping and reversing.

A further object of the present invention is to provide an improved shuttle body that can be manufactured, as a finished or substantially finished unit, by a single molding or casting operation.

A still further object of the invention is to provide an improved shuttle body that can be manufactured at a minimum expense and with the fewest possible machining operations.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the accompanying drawings, which form a part of this specification:

FIG. 1 is an enlarged front elevational view of a conventional shuttle body which is normally machined from steel,

FIG. 2 is a sectional view taken on the line 2—2 of FIG. 1,

FIG. 3 is an enlarged front elevational view of a sewing machine shuttle mechanism embodying the present invention,

FIG. 4 is an enlarged front elevational view of an improved shuttle body that forms part of the mechanism of FIG. 3,

FIG. 5 is a side elevational view of the improved shuttle body as seen from the right side of FIG. 4

FIG. 6 is the other side elevational view of the improved shuttle body as seen from the left side of FIG. 4,

FIG. 7 is a rear elevational view of the shuttle body shown in FIG. 4,

FIG. 8 is a sectional view taken on the line 8—8 of FIG. 4,

FIG. 9 is an enlarged front perspective view of the improved shuttle body, and

FIG. 10 is an enlarged rear perspective view of the same.

FIGS. 1 and 2 of the drawings illustrate a conventional prior art machined shuttle body 16 of a type heretofore used with oscillatory, shuttle-type sewing machines. The shuttle body 16 is normally produced by some sixty machining operations. The shuttle body 16 has a back wall 17, from the front face of which extends a central bobbin-supporting pin 18. The back wall 17 has a curved edge 19 and a cut-away edge 21. From the curved edge 19, there extends a forwardly divergent rear loop-

expanding wall 22 having two apertures 23—23. At the outer edge of the wall 22 there is integrally formed a curved bearing rib 24. From the front of the bearing rib 24 there extends a forwardly convergent front loop-expanding wall 26 having two apertures 27—27. The shuttle body 16 also has the customary loop seizing beak 28, throat 29, and heel 32.

FIGS. 3 through 10 of the drawings illustrate a shuttle body mounting mechanism and an improved shuttle body embodying the present invention. The mechanism comprises a shuttle housing 33 having a raceway (not shown) for accommodating a curved bearing rib 34 of an improved shuttle body 36. The shuttle body 36 carries the usual bobbin case 37 for housing a bobbin (not shown). The bobbin case 37 is restrained against rotary motion with the shuttle body 36 by an arm 38, the free end of which enters a notch 39 formed in a shuttle cap 41. The cap 41 is hinged, as at 42, to the housing 33, and is held in closed position by a pair of latches 43—43 pivotally mounted on screws 44—44. The shuttle cap 41 preferably is formed from a plastic or other suitable material that can be molded, as for example, from nylon, or the like. Also the shuttle body 36 preferably is made in a form that can be molded or cast from a plastic or other suitable moldable or castable material, as for example from nylon, or from Du Pont's brand of acetal resin designated by the trademark "Delrin."

The moldable or castable shuttle body 36 is adapted for use with an oscillatory shuttle-type sewing machine and this shuttle body 36, when in the position shown in FIGS. 3 and 4, has a back wall 51 from the front face of which extends an axially positioned, cylindrical, center, bobbin-supporting pin 52 having an annular groove 53 adjacent to its rounded free end 54. The back wall 51 has a curved edge 56 and a cut-away edge 57. From the curved edge 56 there extends a forwardly divergent rear loop-expanding wall 58 having two rearwardly open apertures, the boundaries or mouths of which are designated by the numerals 61 and 62. The shuttle body 36, at a location slightly forward of the back wall 51, has a needle-clearance flat 64 which has opening into it a rearwardly open aperture the boundary or mouth of which is designated by the numeral 63. At the front edge of the rear loop-expanding wall 58 and adjacent to one side edge of the flat 64, there is formed the previously referred to bearing rib 34. From the front part of the rib 34, there extends a forwardly convergent uninterrupted front loop-expanding wall 67. The shuttle body 36 also has, on what will be termed its leading end, a loop-seizing beak 68 and throat 69, and on what will be termed its trailing end, a heel 71.

In addition, the shuttle body 36 has a curved, part cylindrical, bobbin-cavity side wall 72, FIG. 8, the rear boundary of which is coextensive with the curved edge 56. A continuation of the side wall 72 extends in the leading direction to form a needle-guard wall 73, the walls 72 and 73 being coaxial with the bobbin-supporting pin 52. A continuation, in the trailing direction, of the side wall 72 merges with the rear loop-expanding wall 58 at a location indicated by the numeral 74, FIG. 9. The outer edge of the side wall 72 and the outer edge of the guard wall 73 has a vertically extending crescent shaped flat surface 75, FIG. 9 which functions as a thread control surface. The side wall 72 and a portion of the guard wall 73 also carry a curved overhanging lip 76, FIG. 8, which provides a curved clearance recess 77. Also the shuttle body 36 has several solid portions or spokes. These spokes, which are designated by the numerals 81, 82, 83 and 84, extend between the side wall 72 or the guard wall 73, and the bearing rib 34. Reference to FIG. 7 shows that the spokes 81 and 83 are substantially radially disposed, whereas, the spokes 82 and 84 form an

ang'e with respect to a radius of the shuttle body **36**. Furthermore, the apertures **61**, **62** and **63** are actually the boundaries or mouths of three cavities **91**, **92** and **93**. Circumferentially speaking the apertures **61**, **62** and **63**, as well as their corresponding cavities **91**, **92** and **93**, are of three different sizes. The aperture **63** and the cavity **93** circumferentially are shorter than the aperture **61** and the cavity **91**. Also the aperture **61** and the cavity **91** circumferentially are shorter than the aperture **62** and the cavity **92**. Thus the cavity **93** circumferentially is the shortest cavity, the cavity **92** circumferentially is the longest cavity, and the cavity **91** circumferentially is between the other two in length. Also the cavity **93** is nearest to the beak **68**, whereas the cavity **92** is next, and the cavity **91** is last. In other words the cavity **91** is nearest to the heel **71**. The cavity **91** is bounded on its leading end by the spoke **82** and on its trailing end by the spoke **81**. The cavity **92** is bounded on its leading end by the spoke **83** and on its trailing end by the spoke **82**. The cavity **93** is bounded on its leading end by the spoke **84** and on its trailing end by the spoke **83**. Each of the cavities **91**, **92** and **93** is bounded on its longer curved side by a portion of the bearing rib **34** and on its inner curved shorter circumferential side by a portion of the side wall **72**. The bottom of each of the cavities **91**, **92** and **93** is bounded by a portion of the front loop-expanding wall **67**. All parts of the hereinbefore described shuttle body **36** are fashioned as an integrally formed sing'e moldable or castable unit, which is made in one operation and which, after the molding or casting operation, requires little or no machining.

The hereinbefore described shuttle body **36** has many advantages not found in previously used shuttle bodies. For example:

(1) Since the shuttle body **36** may be formed entirely from a light weight plastic material, the said shuttle body **36**, when so formed, has low inertia and is thus especially adapted for use with oscillatory type sewing machines in which the direction of rotation of the shuttle body is changed several times each second. . . .

(2) The cavity **93**, formed in the needle-clearance flat **64**, is advantageous because, when the shuttle body is made by molding or casting, the cavity **93** prevents a depression or dimple, from forming on the surface of the front loop-expanding wall **67**.

(3) The two cavities **91** and **92**, formed in the rear loop-expanding wall **58** are advantageous because when the shuttle body is made by molding or casting from a plastic material, the cavities **91** and **92** prevent depressions or dimples from forming on the surface of the front loop-expanding wall **67**.

(4) The smooth uninterrupted front loop-expanding wall **67** is advantageous because it prevents lint from entering the shuttle body **36**.

(5) The thread controlling flat surface **75** is advantageous because it helps to control the thread without danger of abrading or cutting the same.

It will be understood that modifications of the hereinbefore described shuttle body **36** may be made without departing from the invention defined by the appended claims. For example, if desired, it would be possible to form the bobbin-supporting pin **52** as a separate piece and then to attach the pin **52** to the back wall **51**. Also, if desirable, it would be possible to provide the throat **69** with a metallic insert. Additionally, the annular groove **53** and the overhanging curved lip **76** may be formed by machining operations. It will also be understood that all surfaces of the shuttle body **36** are provided with sufficient "draft" so that the shuttle body **36** can easily be withdrawn from the die, and that the various cross sections of the shuttle body **36** are designed to minimize distortion.

Having thus set forth the nature of the invention, what I claim herein is:

1. A molded or cast shuttle body comprising a beak formed on the leading end of said shuttle body, a heel formed on the trailing end of said shuttle body, a back wall integral with said shuttle body and having a curved edge, a bobbin-cavity side wall having a portion of its boundaries coextensive with said curved edge, and a rear loop-expanding wall formed at an angle with respect to said back wall, said bobbin-cavity side wall at a location adjacent to said heel merging into said rear loop-expanding wall.

2. A molded or cast shuttle body comprising a beak formed on the leading end of said shuttle body, a heel formed on the trailing end of said shuttle body, a back wall integral with said shuttle body and having a curved edge, a bobbin-cavity side wall having a portion of one of its boundaries coextensive with said curved edge of said back wall, and a rear loop-expanding wall extending from said curved edge of said back wall.

3. A molded or cast shuttle body comprising a beak formed on the leading end of said shuttle body, a heel formed on the trailing end of said shuttle body, a back wall integral with said shuttle body, and a needle-clearance surface formed on said shuttle body, said surface having an aperture.

4. A molded or cast shuttle body comprising a back wall integral with said shuttle body, a needle-clearance surface formed on said shuttle body, and a rear loop-expanding wall extending from said back wall, said needle-clearance surface and said rear loop-expanding wall each having at least one aperture.

5. A molded or cast shuttle body comprising a back wall integral with said shuttle body and having a curved edge, a rear loop-expanding wall extending from said back wall, said rear loop-expanding wall having at least one aperture, a curved bearing rib formed on the outer edge of said rear loop-expanding wall, a bobbin-cavity side wall having a portion of one of its boundaries coextensive with said curved edge of said back wall, and a front loop-expanding wall formed at an angle with respect to said bobbin-cavity side wall, said aperture in said rear loop-expanding wall forming the mouth of a cavity bounded by portions of said curved bearing rib and said bobbin-cavity side wall and said front loop-expanding wall.

6. A molded or cast shuttle body comprising a back wall integral with said shuttle body and having a curved edge, a curved bobbin-cavity side wall having a portion of one of its boundaries coextensive with said curved edge of said back wall, a curved bearing rib concentric with said bobbin-cavity side wall, and a plurality of spokes connecting said bobbin-cavity side wall with said bearing rib.

7. A molded or cast shuttle body comprising a back wall integral with said shuttle body and having a curved edge, a curved bobbin-cavity side wall having a portion of one of its boundaries coextensive with said curved edge of said back wall, a curved bearing rib concentric with said bobbin-cavity side wall, and a plurality of spokes connecting said bobbin-cavity side wall with said bearing rib, some of said spokes being radial and other of said spokes forming an angle with respect to a radius of said shuttle body.

8. An integrally formed molded or cast shuttle body comprising a back wall having a curved edge and a cut-away edge, a central bobbin-supporting pin extending normal to said back wall, an apertured needle-clearance flat formed at a location forward of said back wall, an apertured rear loop-expanding wall extending from said curved edge of said back wall, a curved bearing rib formed on the outer portion of said needle-clearance flat and on the outer portion of said rear loop-expanding wall, a smooth uninterrupted front loop-expanding wall extending from said bearing rib, a curved bobbin-cavity

side wall having a portion thereof formed coaxially with said bobbin-supporting pin, said bobbin-cavity side wall having a portion of one edge coextensive with the curved edge of said back wall and having its outer edge coextensive with a portion of said front loop-expanding wall, a beak formed on a leading portion of said shuttle body, and a heel formed on a trailing portion of said shuttle body.

9. An integrally formed molded or cast shuttle body **36** comprising a back wal **51** having a curved edge **56** and a cut-away edge **57**, a central bobbin-supporting pin **52** extending normal to said back wall **51**, an apertured needle-clearance flat **64** formed at a location forward of said back wall **51**, an apertured rear loop-expanding wall **58** extending from said curved edge **56** of said back wall **51**, a curved bearing rib **34** formed on the outer portion of said needle-clearance flat **64** and on the outer portion of said rear loop-expanding wall **58**, an unapertured front loop-expanding wall **67** extending from said bearing rib **34**, a part cylindrical bobbin-cavity side wall **72** formed coaxially with said bobbin-supporting pin **52**, said bobbin-cavity side wall **72** having a portion of one edge coextensive with the curved edge **56** of said back wall **51** and having its outer edge coextensive with a portion of said front loop-expanding wall **67**, said aperture in said needle-clearance flat **64** and said aperture in said rear loop-expanding wall **58** forming mouths of cavities **91**, **92** and **93** bounded by portions of said curved bearing rib **34**, said bobbin-cavity side wall **72** and said front loop-expanding wall **67**, a beak **68** formed on a leading portion of said shuttle body **36**, and a heel **71** formed on a trailing portion of said shuttle body **36**, said bobbin-cavity side wall **72** at a location **74** adjacent to said heel **71** merging into said rear loop-expanding wall **58**.

References Cited in the file of this patent

UNITED STATES PATENTS

92,068	MacPherson	June 29, 1869
704,923	Regenstein	July 15, 1902
1,185,235	Nelson	May 30, 1916
1,343,823	Hohmann	June 15, 1920
2,098,269	Wood	Nov. 9, 1937

FOREIGN PATENTS

83,048	Sweden	Apr. 2, 1935
725,349	Great Britain	Mar. 2, 1955
728,247	Great Britain	Apr. 13, 1955