Nov. 24, 1964 R. BOGGILD ETAL 3,157,933

EXTRUDER

Original Filed Oct. 29, 1959 2 Sheets-Sheet 1

Fig. 1

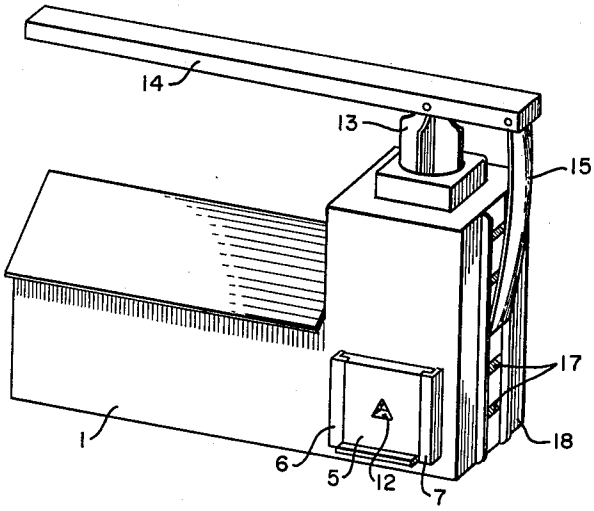


Fig. 2

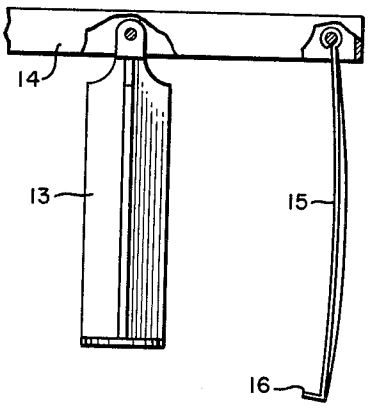


Fig. 3

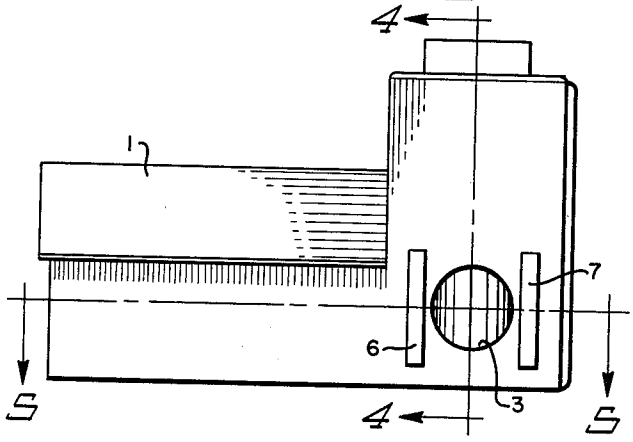


Fig. 4

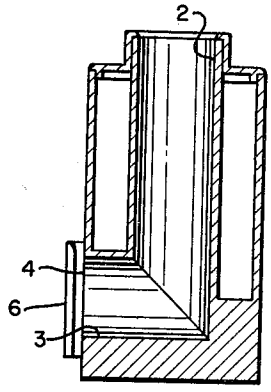


Fig. 5

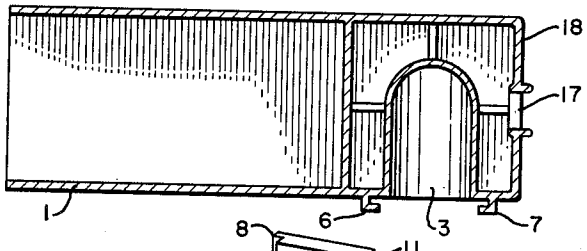


Fig. 6

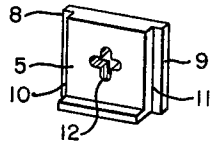
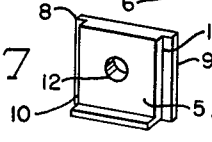


Fig. 7



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EXTRUDER

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Fig_8

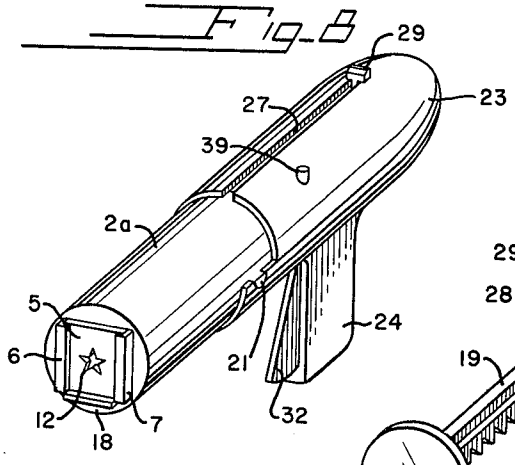


Fig_9

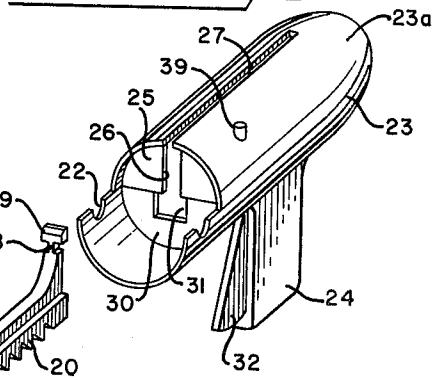


Fig_10

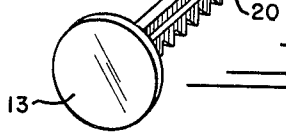


Fig_11

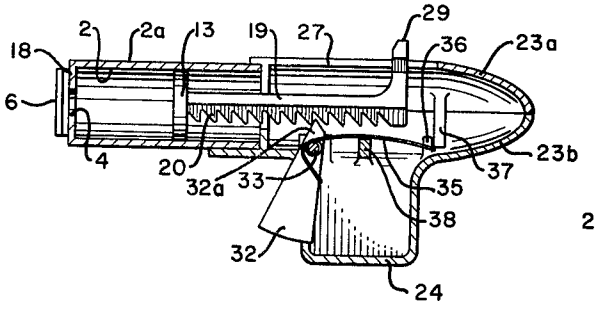


Fig_12

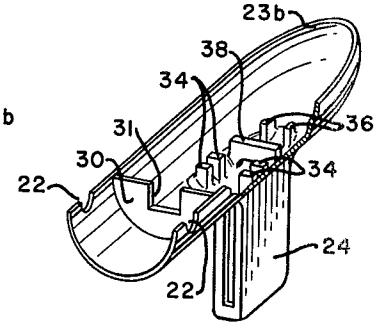
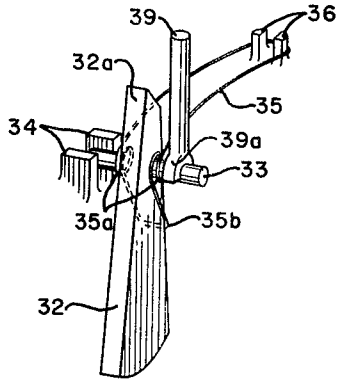


Fig_13



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3,157,933
EXTRUDER

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Continuation of application Ser. No. 849,645, Oct. 29, 1959. This application Aug. 15, 1963, Ser. No. 303,721
6 Claims. (Cl. 25—11)

This is a continuation application of our copending application Serial No. 849,645 filed October 29, 1959, which is a continuation of our application Serial No. 844,272, filed October 5, 1959.

The present invention relates to improvements in educational devices and has particular reference to new and improved extrusion apparatus for forming toys or other decorative objects from modeling clay or the like.

An object of the invention is to provide an improved extrusion apparatus for forming objects such as toys from modeling compound or the like.

Another object of the invention is to provide apparatus of the type set forth which is relatively simple and economical in construction and efficient in operation.

Another object of the invention is to provide in compact, convenient form for use by children and others an improved extrusion type of apparatus with which plastic media may be molded into instructive and decorative plastic shapes and objects.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a perspective view of a toy extruder embodying the invention.

FIG. 2 is a view showing the operating lever and the manner in which the operating piston and hook are connected thereto;

FIG. 3 is a side elevation view of the housing structure of FIG. 1;

FIG. 4 is a sectional view of the housing structure of FIG. 3 taken along the lines 4—4;

FIG. 5 is a sectional view taken along the lines 5—5 of FIG. 3;

FIG. 6 is a view illustrating a typical die for use with the structure of FIGS. 1–5;

FIG. 7 is a view illustrating a typical die having a different type of opening than that of FIG. 6;

FIG. 8 is a perspective view of an extruder illustrating another embodiment of the invention;

FIG. 9 is a perspective view showing the handle portion of the embodiment of FIG. 8;

FIG. 10 is a perspective view of the piston and ratchet portion of the embodiment of FIG. 8;

FIG. 11 is a sectional view of the embodiment of FIG. 8;

FIG. 12 is a perspective view, partly broken away, illustrating the lower half of the handle portion of FIG. 9; and

FIG. 13 is a perspective view illustrating the details of the spring and trigger mechanism.

FIGS. 1–5 inclusive disclose an improved extrusion press embodying the invention intended for use to form a relatively soft plastic material, such as modeling clay, into strips having a variety of different cross sections.

So as to appeal to children, the body portion of the improved extrusion device may be in the shape of a building or housing structure 1 having a vertically disposed cylindrical bore 2 provided therein and a passageway 3 communicating between the lower portion of the cylindrical bore and an opening 4 provided in a side of the building structure.

In accordance with the invention, it is contemplated that a plurality of dies 5 may be employed to enable a child to remove and replace a die having a differently shaped opening whenever a different design or shape of molded article is desired. It is to be understood that although two specific dies are illustrated and described herein, it is to be understood that such illustrations are for the purpose of illustration only and not of limitation. The shapes of the openings in the dies and thus the number of different shaped molded articles that may be produced is almost unlimited, the only requirement being that the dies be physically interchangeable one with another and that they may be removed from the extruder easily and easily replaced with another die having an opening of a different shape.

To receive and support die 5, there are provided on structure 1 rabbeted members 6 which conveniently may be formed of the same material as the extruder housing structure particularly if such structure is formed of molded plastic material. Alternatively, if the housing structure is constructed of a different material, rabbetted members 6, 7 may be conveniently secured thereto in any convenient manner such as, for example, by means of threaded fastening means (not shown). The side portions 8, 9 of dies 5 are provided with complementary rabbeted portions 10, 11 so that such complementary rabbeted portions may, easily slide into the space between the housing structure 1 and members 6, 7 so as to hold a die securely in place and flat against the housing structure when inserted into such space. When so inserted, the opening 12 in die 5 is in registry with the above mentioned communicating passageway 3 which thus establishes communication between the lower portion of cylindrical bore 2, opening 4, and die opening 12.

A piston member 13 is pivotally connected to an operating lever 14. At one end of operating lever 14, there is pivotally connected a hook-like member 15 having a free end 16 which is adapted to engage a notch or opening 17 provided in a side or wall 18 of housing structure 1 at a desired location. When hook 16, handle 14, and piston 13 are so engaged, an operator may squeeze or extrude soft plastic material, such as modeling compound, which has been placed in bore 2 into a desired shape corresponding to the opening in a die 5 secured, in the manner noted above, with the die opening 12 in registry with the communicating passageway 3, by pressing downwardly on operating lever 14. The downward motion thus imparted to operating lever 14 causes piston 13 to be forced downwardly in cylindrical bore 3 and thus exerts a squeezing pressure on the soft plastic material or modeling compound previously inserted within cylindrical bore 3.

In order to provide ease of operation irrespective of the quantity of plastic material or modeling compound that may have previously been inserted within cylindrical bore 3, there are provided a plurality of notches 17 in a

side wall 18 of housing structure 1, such notches being spaced apart from each other in a vertical direction. Notches 17 are adapted to be engaged by the free end portion 16 of hook-like member 15 to provide a fulcrum for operating lever 14, the vertical height of such fulcrum being selectively adjustable and dependent upon which of said notches the free end 16 of hook-like member 15 is engaged.

In operation a desired quantity of soft plastic material, such as modeling compound, is placed into cylindrical bore 2. A die 5, having a shape of opening according to the desired shape of a plastic object sought to be produced, is secured with the die opening 12 in registry with communicating passageway 3 in the manner previously described. If there is inserted within cylindrical bore 2 a relatively large quantity of plastic material or modeling compound, the free end 16 of hook-like member 15 is placed in engagement with one of the uppermost notches 17 and piston member 13 inserted into the uppermost portion of cylindrical bore 2. By pressing downwardly on the free end of operating lever 14, a squeezing pressure is applied to the plastic material or modeling compound within the bore 2, and the material is thereby caused to flow through communicating passageway 3 and outwardly through the opening 12 of die 5 to form a plastic object of desired shape. The objects so formed may be cut off at a desired length by placing a knife or other suitable instrument flat against the face of die 5 and severing the object thus formed.

After some quantity of the plastic material or modeling compound has been formed into objects thereby depleting the supply thereof, or if a relatively small quantity of material is placed in bore 2, the angularity of operating lever 14 with respect to piston 13 and hook-like member 15 may become unsuited to perform or to continue the squeezing operation. When this occurs, the operator merely disengages the hook portion 16 of hook-like member 15 from that notch with which it was previously engaged and reengages it with another notch 17 to once again provide desired respective angularity between the operating lever and the piston and hook-like member for efficiency in operation. As the supply of plastic material or modeling compound continues to be depleted, still further adjustment of angularity may be had by re-engaging the hook portion 16 in still another notch 17. Thus, there is provided an extremely high degree of adjustability without undue complexity or excessive cost of manufacturing, an extrusion device which is capable of operating efficiently over a wide range of operating conditions irrespective of the relatively high or low quantities of plastic material or modeling compound that may be employed at any particular time. At the same time, there is provided not only a high degree of adjustability but adjustability is obtained in a relatively simple manner and may be accomplished with ease even by children who may be operators of the device. In addition, a wide variety and assortment of different shapes may be formed merely by removing a particular die 5 that may be secured in place by rabbetted members 6, 7 and replacing said die with another having a different shape of die opening 12.

A modified embodiment of the invention is illustrated in FIGS. 7–13 in which the cylindrical bore 2 is provided in a housing member 2*a* in the form of a cylinder. A forward end wall 18 of the cylinder is provided with an opening 4 communicating with the cylindrical bore. Rabbetted members 6, 7 may be part of end wall 18 of the cylinder structure or, alternatively, may be conveniently secured thereto in any convenient known manner such as, for example, by means of threaded fasteners (not shown). As illustrated in connection with FIGS. 6, 7, the side portions 8, 9 of die 5 are provided with complementary rabbeted portions 10, 11 so that such complementary portions may easily slide into the space between the forward wall 18 of the cylinder structure and rabbeted members 6, 7 to hold a die securely in place and flat against the forward wall when inserted into such space. As noted heretofore, when so inserted, the opening 12 in die 5 is in registry with the above-mentioned opening 4 to establish communication between the cylindrical bore and opening 12 in the die.

As best shown in FIGS. 10, 11, a piston 13 is carried by a ratchet member 19 having downwardly extending teeth 20. Near the end of cylinder housing 2*a* and opposite forward wall 18, there are provided a pair of oppositely disposed retaining lugs or outwardly extending projections 21 adapted to be inserted in complementary openings or recesses 22 provided in a member 23 having a handle portion 24 integral therewith, or, alternatively, secured thereto. For reasons which will become apparent as the description proceeds, member 23 may conveniently comprise upper and lower halves 23*a*, 23*b* respectively. The upper half 23*a*, is best illustrated in FIGS. 9 and 11 and comprises a hollow shell-like structure having a forward end wall 25 having an opening 26 provided therein which opening communicates with a longitudinally extending slot 27 also provided in the upper half 23*a*. The shape of opening 26 is such as to enable an upstanding end portion 28 of ratchet member 19 to be received therethrough with a knob 29 extending above the longitudinally extending slot 27. The lower half 23*b* (FIGS. 11, 12) is a similarly shaped shell-like member having a forward wall 30 having an opening 31 provided therein to facilitate and guide the lower portion of ratchet member 19 for reciprocatory movement relative to said wall portion. Forward wall 25 of upper half 23*a* and forward wall 30 of lower half 23*b* are so located in their relative halves so that they form a substantially continuous and unbroken wall when the two halves are assembled together, except for openings 26 and 31 provided in the respective forward wall portions.

A trigger member 32 having a transverse shaft 33 is supported by the lower half 23*b* with said transverse shaft interposed between oppositely disposed and spaced apart pairs of upstanding lugs 34 provided in the scooped out portion of the lower half in which position portions of the trigger member below the transverse shaft are disposed within a vertically extending slot provided in handle portion 24 of the lower half 23*b*. As noted heretofore, ratchet member 19 is inserted into openings 26 and 31 with the knob portion extending through and above the longitudinally extending slot 27. With the ratchet member and trigger member so disposed, a portion 32*a* of trigger member extending upwardly above transverse shaft 33 engages the downwardly extending teeth 20 of ratchet member 19.

To insure proper engagement of portion 32*a* of the trigger member with the teeth 20 of the ratchet member and to provide motive power for the operation of the device, a spring member 35 is provided (FIGS. 11 and 13). Spring member 35 comprises a pair of spaced and axially aligned coil portions 35*a* through which the oppositely disposed end portions of transverse shaft 33 extend and a loop portion 35*b* downwardly extending below the transverse shaft and engaging the trigger member 32. Remaining portions of spring member 35 are cantilevered outwardly and to the right of transverse shaft 33 and extend outwardly from the rear side of trigger member 32. At a convenient location between the outermost right end portion of spring member 35 and the transversely extending shaft 33, there are provided in the lower half 23*b*, a pair of upstanding projections 36, which are integral with lower half 23*b* or, alternatively, may be conveniently secured thereto. The outermost right-hand end portion of spring member 35 is looped around upstanding projections 36 and is secured by a downward projection 37 from upper half 23*a*. To provide an upward force on the central portion of spring member 35, another upstanding projection 38 is provided in lower half 23*b* which constantly urges the uppermost end portion 32*a* of the trigger member into engagement with the downwardly extending teeth 20 of ratchet member 19.

As noted in the preceding paragraph, the relationship of the various upstanding and downwardly projecting portions **36**, **37**, **38** and spring member **35** is such that, when assembled the uppermost portion **32***a* of trigger **32** is urged into engagement with the downwardly extending teeth **20** of ratchet member **19**. To facilitate disassembly, there is provided a trigger release member **39** having a lower end portion **39***a* engaging shaft **33** (FIG. 13) with the upper end of trigger release member **39** projecting through a suitable opening provided in the upper half **23***a* (FIGS. 8, 9). By depressing trigger release member **39**, an operator can thereby disengage trigger portion **32***a* from teeth **20** and retract piston **13** by means of knob **29** which extends above upper half **23***a* through slot **27**. Once piston **13** has been fully retracted, cylinder housing **2***a* may be removed by merely lifting it so that projections **21** clear the complementary recesses **22**.

In operation, cylindrical housing **2***a* is disassembled in the manner heretofore described and a desired quantity of soft plastic material is placed within cylindrical bore **2**. Housing **2***a* containing such material is then reassembled by placing the open end of cylindrical bore **2** around retracted piston **13** with projections **21** secured in complementary recesses **22**. A die **5** having a shape of opening according to the desired shape of plastic object sought to be produced is secured with die opening **12** in registry with opening **4**. By grasping handle portion **24** and squeezing trigger **32**, an operator causes trigger **32** to rotate in a counter-clockwise direction (FIG. 11) relative to shaft **33** so that trigger portion **32***a* by engaging teeth **20** causes ratchet member **19** and piston **13** to move to the left in FIG. 11. Piston **13** will move to the left by an amount corresponding to the spacing between teeth **20** each time the trigger **32** is squeezed and released so that ultimately piston **13** contacts the material previously placed within cylindrical bore **2** and exerts a squeezing pressure thereon ultimately forcing such material through opening **4** and die opening **12**. After the supply of plastic material in cylindrical bore **2** has been depleted, the operator presses trigger release **39** and retracts piston **13** by means of knob **29** thus permitting the removal of cylindrical housing **2***a* in the manner heretofore described, following which the supply of plastic material can be replenished and the apparatus reassembled for further use.

While particular embodiments of the invention have been illustrated and described, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from the invention and it is intended to cover in the appended claims all such changes and modifications that come within the true spirit and scope of the invention.

What we claim is:

1. A toy extruder for modeling compound comprising,
a housing having a top wall and four side walls,
an L-shaped bore in said housing having a vertical leg opening out of said top wall and a horizontal leg opening out of said side wall,
a plunger in the vertical leg of said bore, said plunger having four vertical ribs engaging the side walls of the vertical leg of said bore to center said plunger in said bore,
a lever pivoted intermediate its ends to the top of said plunger,
an elongated pawl pivoted at its upper end to said lever on an axis located above one of said side walls, said pawl having an upwardly inclined hook at its lower end, said pawl being bowed away from said side wall thereby causing said hook to swing toward said side wall beyond a vertical projection of the pivot axis of said pawl,
said last named side wall having a plurality of vertically spaced notches engageable by said hook, and a vertical flange on each side of said notches to guide said hook into engagement with said notches.

2. A toy extruder for modeling compound comprising,
a housing having a top wall and four side walls,

an L-shaped bore in said housing having a vertical leg opening out of said top wall and a horizontal leg opening out of said side wall,
means adjacent the side wall opening for removably receiving an extrusion die,
a plunger in the vertical leg of said bore, said plunger having four vertical ribs engaging the side walls of the vertical leg of said bore to center said plunger in said bore,
a lever pivoted intermediate its ends to the top of said plunger,
an elongated pawl pivoted at its upper end to said lever on an axis located above one of said side walls, said pawl having an upwardly inclined hook at its lower end, said pawl being bowed away from said side wall thereby causing said hook to swing toward said side wall beyond a vertical projection of the pivot axis of said pawl,
said last named side wall having a plurality of vertically spaced notches engageable by said hook, and a vertical flange on each side of said notches to guide said hook into engagement with said notches.

3. A toy extruder for modeling compound comprising,
a housing having a top wall and four side walls,
an L-shaped bore in said housing having a vertical leg opening out of said top wall and a horizontal leg opening out of said side wall,
a plunger in the vertical leg of said bore,
a lever pivoted intermediate its ends to the top of said plunger,
and an elongated pawl pivoted at its upper end to said lever on an axis located above one of said side walls, said pawl having a hook at its lower end, said pawl being bowed away from said side wall thereby causing said hook to swing toward said side wall beyond a vertical projection of the pivot axis of said pawl,
said last named side wall having a plurality of vertically spaced notches engageable by said hook.

4. A toy extruder for modeling compound comprising,
a housing having a top wall and four side walls,
an L-shaped bore in said housing having a vertical leg opening out of said top wall and a horizontal leg opening out of said side wall,
a plunger in the vertical leg of said bore,
a lever pivoted intermediate its ends to the top of said plunger,
an elongated pawl pivoted at its upper end to said lever on an axis located above one of said side walls, said pawl having a hook at its lower end,
said last named side wall having a plurality of vertically spaced notches molded integrally therein engageable by said hook, and a vertical flange on each side of said notches to guide said hook into engagement with said notches.

5. A toy extruder for modeling compound comprising,
a housing having a top wall and four side walls,
an L-shaped bore in said housing having a vertical leg opening out of said top wall and a horizontal leg opening out of said side wall,
a plunger in the vertical leg of said bore, said plunger having four vertical ribs engaging the side walls of the vertical leg of said bore to center said plunger in said bore,
a lever pivoted intermediate its ends to the top of said plunger,
and an elongated pawl pivoted at its upper end to said lever on an axis located above one of said side walls, said pawl having a hook at its lower end,
said last named side wall having a plurality of vertically spaced notches engageable by said hook.

6. A toy extruder for modeling compound comprising,
a housing having a top wall and four side walls,
an L-shaped bore in said housing having a vertical leg opening out of said top wall and a horizontal leg opening out of said side wall,

a plunger in the vertical leg of said bore,

a lever pivoted intermediate its ends to the top of said plunger,

an elongated pawl pivoted at its upper end to said lever on an axis located above one of said side walls, said pawl having an upwardly inclined hook at its lower end, said pawl being bowed away from said side wall thereby causing said hook to swing toward said side wall beyond a vertical projection of the pivot axis of said pawl,

said last named side wall having a plurality of vertically spaced notches engageable by said hook, and a vertical flange on each side of said notches to guide said hook into engagement with said notches.

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