Sept. 5, 1939. S. ROTHSCHILD 2,172,072

MAGAZINE KNIFE AND BLADE THEREFOR

Filed Dec. 17, 1936 2 Sheets-Sheet 1

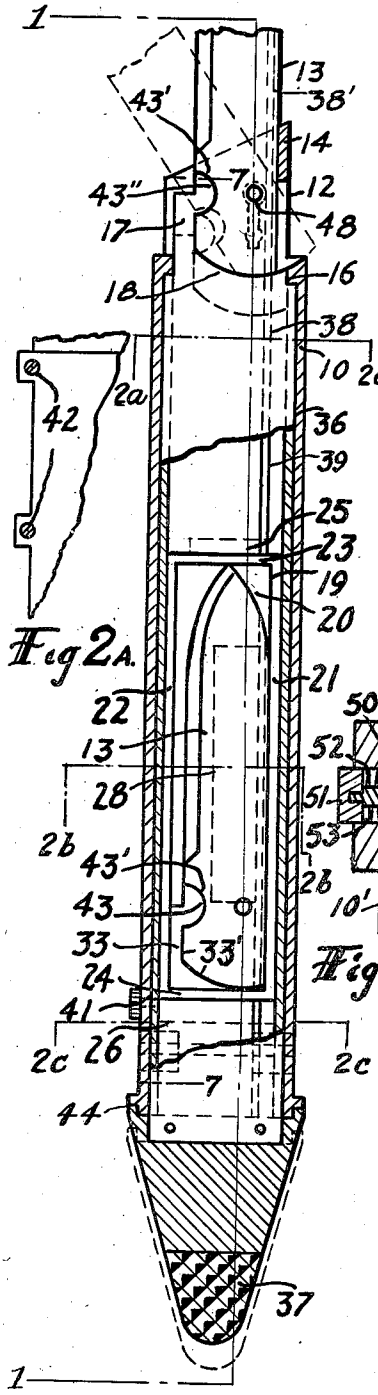

Fig 2.

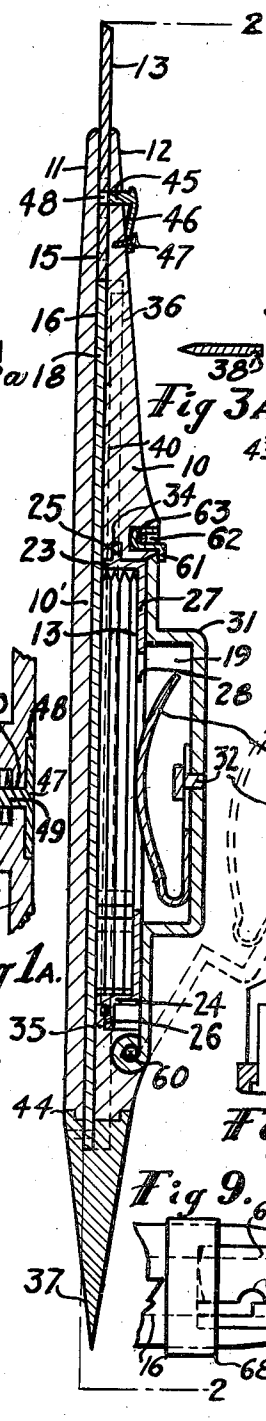

Fig 1.

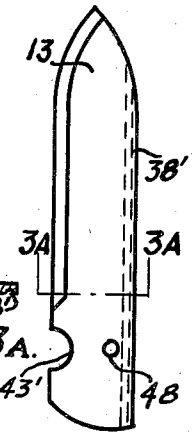

Fig 3.

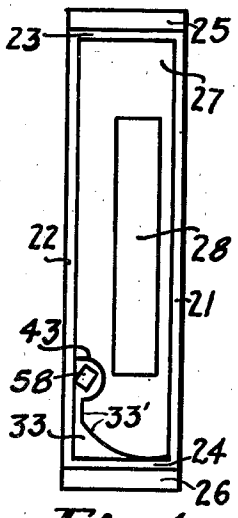

Fig 4.

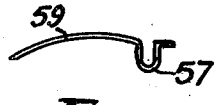

Fig 5.

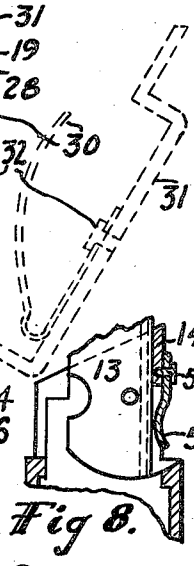

Fig 8.

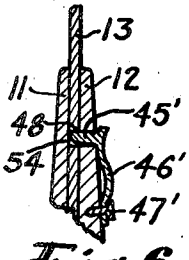

Fig 6.

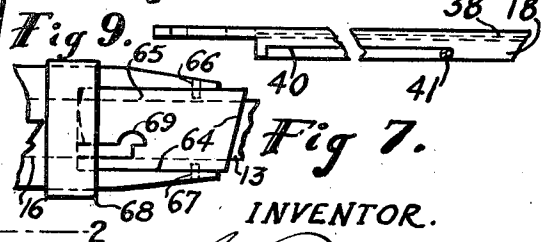

Fig 9.

Fig 7.

INVENTOR.

Sol Rothschild

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Fig. 9-B.

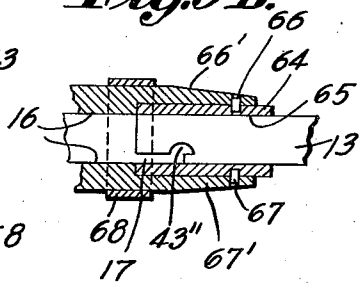
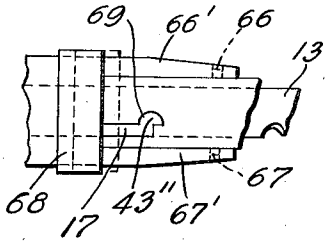


Fig. 9-C.



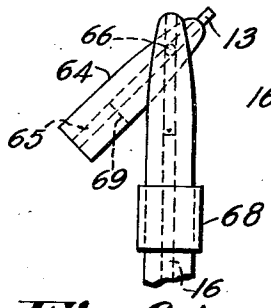


Fig. 9-A.

Fig. 10.

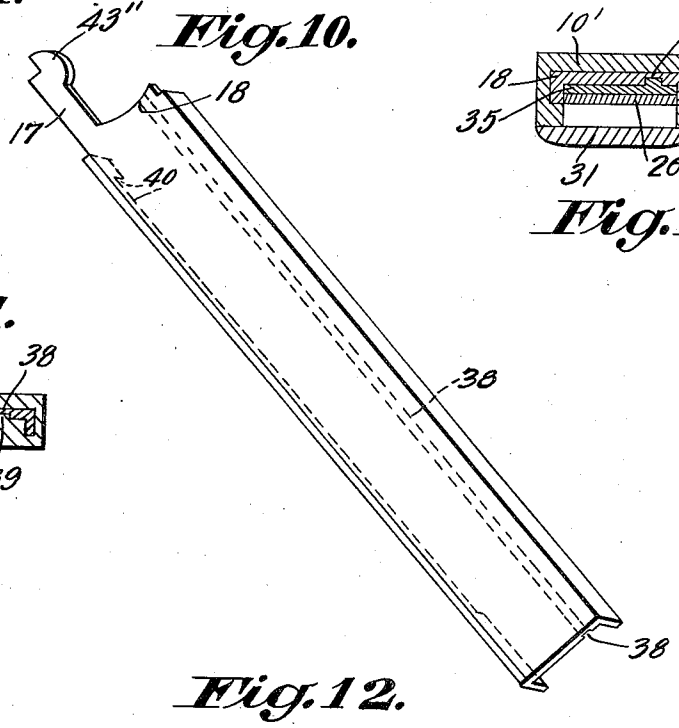


Fig. 13.

Fig. 11.

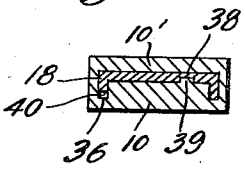
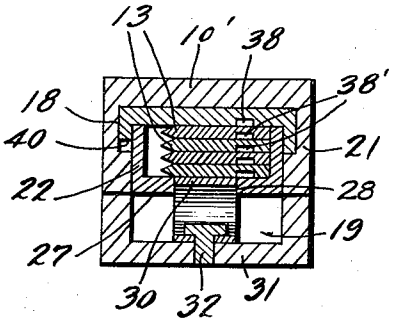


Fig. 12.



Inventor.

Sol Rothschild

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UNITED STATES PATENT OFFICE

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MAGAZINE KNIFE AND BLADE THEREFOR

Sol Rothschild, Brooklyn, N. Y.

Application December 17, 1936, Serial No. 116,267

16 Claims. (Cl. 30—162)

This invention relates in general to improvements in magazine knives, scalpels, and the like, such as employ separate blades and has for its main object to provide an improved delivery device for feeding blades, such as are used in said devices, one at a time from a stack of blades.

Another object of the invention is to provide an improved means for holding knife blades in a blade holding means and for ejecting blades therefrom to provide a vacancy for the incoming blade.

Another object of the invention is to provide a simple delivery means which has a cooperating member to interlock with a specially designed knife blade and hold same firmly and securely in a predetermined aligned position throughout the entire process of feeding the blade from the magazine to the holding means, said means comprising a simple slide of a design which eliminates moving parts thus insuring against possible jamming of the instrument as the result of breakage of the moving parts or the getting out of order of the moving parts, or due to displacement of a long knife blade which is dependent upon being held by an unsharpened portion as is usually provided at one end of knife blades, therefore such a blade if not held firmly could easily dip at its front end in the course of being fed. In this connection, it should also be observed that knife blades, and the like, must be held while being fed as above stated (with the major portion of the blades extended from the feeding means) for the purpose of protecting the cutting edges from bearing surfaces and when held in the holding means they must be held in a similar fashion to allow for clearance on both sides of the blades for cutting. Therefore, it is an express object of the invention that the above specified in this paragraph will not loosely hold the blade but rather hold the blade firmly and securely.

Another object of the invention is to hold control of the blade until it is completely ejected from the holding means so that if it is desired to withdraw the blade back into the magazine for any purpose it may be readily accomplished.

Another object of the invention is to provide a slide and a blade with cooperating portions by which the slide may be released from said blade only as it moves the blade out of the holding means. This is of particular advantage in such knives as surgeons use wherein firm holding of the blade is essential and release thereof is only made possible by the movement of the slide.

A further object of the invention is to provide a means for ejecting a blade from the holding mean without the use of a blade being fed from the magazine or without the necessity of feeding a blade therefrom.

I am aware that others have made attempts to provide means, in other types of devices, for preventing the feeding of the top blade from a stack by frictional engagement with the feeding slide, all of these devices, however, resort to cooperative moving parts, which at best, are always in danger of getting out of order and besides they do not always answer the purpose, therefore, another object of this invention is to provide a simple immovable means for preventing such frictional feeding.

My invention is illustrated as embodied in a magazine repeating knife, and for this reason it is to be understood at the very outset that it includes certain features as disclosed in my copending application Serial Number 63,362, filed February 11, 1936, for Scalpels and now Patent No. 2,131,358. It is also to be understood that while I illustrate my invention as employed in a knife, I do not wish to be limited to its use therein, it being adaptable in all devices wherever blade delivery is employed.

Besides the above stated objects, my present invention comprises novel details of improvement and other objects as pointed out in the annexed claims, and which are more fully hereinafter set forth by referring to the drawings, wherein:

Figure 1 is a sectional view of my device taken on the line 1—1 Figure 2 and showing in dotted lines the magazine door open, and the blades in elevation.

Figure 1A is a modified fragmentary section of the side wall 10′ of my device taken on the same line 1—1 as Figure 1.

Figure 2 is a sectional view of my device taken on the line 2—2 Figure 1, with part of the slide broken away and showing by dotted lines the slide being drawn back releasing the blade from the holding means.

Figure 2A is a fragmentary side elevational view of my device showing a modified construction of the case or handle members.

Figure 3 is a view of the blade employed in my device.

Figure 3A is a sectional view of the blade taken on the line 3a—3a Figure 3.

Figure 4 is a side plane view of the blade clip employed in my device for holding a stack of blades.

Figure 5 is a spring member for use in con-

nection with the blade clip to retain the blades therein when not in the holder.

Figure 6 is a fragmentary sectional view of a modified form of my blade holding means.

Figure 7 is a fragmentary view of the slide used in my device taken on the line 7—7 Figure 2.

Figure 8 is a fragmentary sectional view of the blade holding means on the same plane as that shown in Figure 2 and illustrating a blade holding and ejecting means thereon.

Figure 9 is a fragmentary side elevational view showing a modified arrangement of my holding and releasing means.

Figure 9A is a top view of the holding means shown in Figure 9 rotated to release a blade therefrom.

Fig. 9B is a longitudinal sectional view of that shown in Figure 9.

Fig. 9C is a view of that which is shown in Figure 9 showing the slide in a position unlocking the holding means. The dotted lines show the slide in locking position.

Fig. 10 is a perspective view of the element 18 with the grip 37 omitted.

Fig. 11 is a transverse section of my device taken on the line 2*a*—2*a* Fig. 2.

Fig. 12 is a transverse section of my device taken on the line 2*b*—2*b* Fig. 2 and drawn to larger scale.

Fig. 13 is a transverse section of my device taken on the line 2*c*—2*c* Fig. 2.

Although my knife may take any suitable shape, in the preferred form it consists of a handle 10 which is substantially rectangular in cross-section and hollow for the most part.

At one end of the handle is provided a pair of blade holding jaws 11 and 12, which support the blade 13 on its sides as shown in the drawings. These jaws are shown as forming a tapered part of the handle 10 and are joined at 14, but it is to be understood that they may be made, if desired, of resilient, or partially resilient, members which would have a clamping effect, and be attached to the handle in any convenient manner. As in the drawings, the space 15 formed in the jaws is equivalent in width to the width of the restricted passage or slit 16 through which the blade 13 is snugly slidable and except for the connecting portion 14, the jaws are otherwise open or separated as clearly shown in Figures 1 and 2. The depth of the passage 16 is at least sufficient to accommodate the blade 13 and the tongue 17 and the very end of the slide 18. This passage joins with the magazine 19, which is provided in the hollow portion of the handle, and forms the opening through which the blades are carried by the slide 18 when being fed one at a time from the magazine into the holding means. In the magazine 19 is placed a stack of blades 13 usually supplied, for convenience, in a clip 20. The clip has top and bottom walls 21 and 22, and front and rear walls 23 and 24, respectively; the front wall preferably having a forwardly extending lip 25 and the rear wall a rearwardly extending lip 26. In the side wall 27 is a slot 28 through which a spring 30, which is secured to the magazine door 31 preferably by the screw 32, extends to push the stack of blades sidewise for feeding. Against the inside of the rear wall 24 of the clip and the inside of the bottom wall 22 is a portion 33 which engages correspondingly shaped portions 33′ in the blades 13 and together with the top wall 21 of the clip holds the blades in a predetermined aligned position in the clip with the cutting edges of the blades free of any bearing surfaces. It should also be observed that with this arrangement the blades can be put into the clip in only one direction. The cutting edges of the blades may take any shape. The clip is snugly slidable into the magazine and rests on the top and bottom walls thereof and is held in a predetermined fixed position therein by the narrower forwardly extending lip 25 on the front wall 24 engaging in male relationship in the recess 34 formed in the front wall of the magazine and by the rearwardly extending lip 26, on the rear wall 24 of the clip, bearing against the side wall of the magazine at 35 and held there by the inside of the magazine door 31 bearing against the side wall 27 of the clip as shown. The blades are fed by the slide 18 which is preferably U-shaped, and of any desirable length, and fits into a correspondingly U or other shaped groove or channel 36 in the handle 10 and has a grip 37 at one end by means of which it is slid back and forth. The slide 18, which has a small recess 38 on its inside which engages in male and female relationship on a raised portion 39 formed in the restricted passage 16, passes with a sliding fit between the side wall 10′ of the handle 10 and over the stack of blades and projects a blade at a time from the top of the stack. As shown in Figures 1 and 7, the slide is also recessed at 40 on its bottom side to provide a stop means, as by the pin or screw 41 which limits the rearward action of the slide. In this respect, however, I prefer a thumb screw so that, as in the case of a surgeon's knife which is subject to constant sterilization, the screw may be taken out and the slide may be removed for proper cleaning and drying. In this connection it should be noted that the side wall 10′ of the handle 10 and the jaw 11 connected therewith could be manufactured as a separate unit, which is my preference, and then secured to the handle by means of screws 42 in any convenient way, for example, as I show in the fragmentary side elevational view Figure 2A, thus, making it possible to be removed for the convenience of giving the knife a thorough cleaning and drying on the inside.

The blades for my device are each provided with a small recess 38′, on only one side thereof, and said recess is of the same dimensions and in the same relative position in the blade, as it is held by the slide, as the recess 38 is in the slide 18. Thus it will readily be seen that when the slide 18 is in proper receiving position, and a blade is urged from the stack to interlock therewith, the recess 38′ in the blade is in alignment with the recess 38 in the slide as if to form a continuation thereof, and therefore, when it is fed from said position the recess 38′ in the blade also engages in male and female relationship on the raised portion or track 39, provided in the restricted aperture 16 only, and together with the tongue 17 on the slide 18 which holds the blade interlocked provides a means for keeping the blade locked into a predetermined aligned position. Now it should be observed that because of the semi-circular end 43 of the member 33 in the blade clip 20 engaging in a correspondingly shaped portion 43′ in the blades they are locked in a longitudinal direction and feeding thereof as a result of friction by the slide is absolutely prevented. When it is desired to feed a blade from the stack, slide 18 is drawn rearwardly by the grip 37 until it is stopped by the pin or screw 41 as previously described. In this position the end of the slide 18 which is curved, as shown, to correspond in shape and size to the rear of the

blade 13, the tongue 17, and its semi-circular end portion 43'' thereon, are all in alignment with their corresponding portions of the member 33 in the clip, and then, the topmost blade on the stack is free to be urged by the spring 30 to engage or interlock on the end of the slide where it is held firmly and securely. The slide with the blade thereon is then moved forward until the grip 37 seats itself at 44, and in this position the blade is properly and firmly in the holding means, it being locked therein between the tongue 17 with its semi-circular end 43'' and the jaw connecting portion 14 at the top of the jaws 11 and 12 and the spring 55 as shown for convenience in Figure 8. In this connection it is to be understood that the tongue 17 and its head 43'' may be any desirable size and shape that would give the stated result, and in which case the recess in the blade will take a corresponding size and shape. It can be readily seen that thus held the blade can be moved from the holding means back into the magazine, if desired, without disturbing the blades in the magazine or ejecting the blade so engaged in the holding means, and it may be brought forward and backward as often as desired. However, should the operator desire to release the blade from the holding means, so as to be able to feed another blade thereinto, or for other reasons, it is done as follows:—In the jaw 12 I have provided a pin 45 fixed to a spring member 46 and attached to the outside of the jaw 12 by the screw 47 in a manner to retain the inside end of the pin to be normally held by the spring flush with the inside of the jaw 12, as shown, thus allowing free passage of the blade when it is being fed between the jaws or moved rearwardly therebetween. When the operator wishes to release the blade, he presses the pin inward so as to engage the blade in the aperture 48 therein, as it is aligned therewith, and then, as the slide is drawn rearwardly, the blade is forced to rotate on the pin 45 due to the semi-circular member 43'' on the end of the tongue 17, having a cam-like action on the correspondingly shaped portion 43' in the blade 13. It is obvious other means equivalent to the pin may be substituted therefor to cooperate in ejecting blades from the holding means and the cam-like action of the end or head of the tongue in a correspondingly shaped recess in a blade for rotating same is one of the express features of this invention. When the slide is drawn back clear of the blade, the blade is free to be dropped from the holder the instant the pin is released and it is urged by the spring 46 back to its normal position, thus disengaging the blade. It should be noted that with my arrangement a blade may be ejected from the holding means without the necessity of feeding a new blade thereinto. It should also be noted that by eliminating the necessity of having a new blade force an old blade out of the holding means, as is common practice in blade delivery devices for other uses, it is possible to feed the necessary blades of the type I employ without endangering the front pointed portion of the cutting edges thereof.

If for some reason it becomes necessary to put the blade, which is in the holding means, back upon the stack in the magazine so that the slide can be brought back to its normal closed position without feeding a blade from the magazine this is accomplished in the modified form of my device wherein a mechanism as shown in Figure 1A is provided in the wall 10', for instance directly opposite the magazine. The rest of the device being the same, I show only the mechanism as if included in the wall 10' as in the Figure 1 and as at the position shown. When the slide is drawn rearwardly with a blade thereon, as described above, and it is brought to receiving position as if to receive a blade, it is obvious the blade now on the top of the stack cannot be urged therefrom because of the blade already held by the slide. Now referring to Figure 1A, 10' is the side wall of the handle wherein is provided a plate 47, preferably rectangular in shape, and set into a correspondingly shaped recess 48 provided to accommodate same in a flush relationship to the inside of the wall 10'; a shank 49 extends from one side thereof, through a bore 50 and is screw threaded into a button 51 and carries a spring 52 as shown. The button and spring and part of the shank are housed in the recess 53. By pressing the outside of the button the plate 50 is urged against the blade held by the slide forcing it therefrom thus depressing the entire stack sidewise to make room thereon for the blade being forced from the slide. The slide is then brought forward while the blade is held by the plate on top of the stack and out of the pathway of the slide, the button 51 is then released so that the slide may complete its action forward after having delivered the blade back upon the stack in the magazine.

In Figure 6, I show a modified arrangement of the jaw 12 of my device wherein the pin which is carried therein to engage in the aperture 48 in the blade, for the purpose as described above, is normally urged inward in place of outward and therefore, referring to the Figure 6, it is necessary for the pin 45' which is fixed to a spring 46' and attached to the outside of the jaw 12 by the screw 47' to have a rounded portion at 54 so as to work cam-like to permit the blade to depress it and pass freely thereover. However, when the aperture 48 in the blade reaches the pin, the pin is urged thereinto and acts as a positioning stud and an additional holding means as well as being used for the blade to rotate thereupon in a similar fashion and for the purpose as described above in connection with pin 45. It is obvious that should it be necessary to withdraw the blade back into the magazine it can easily be accomplished by holding the pin 45' out of engagement with the aperture 48 of the blade and drawing the slide rearwardly.

In Figure 8, I show a mechanism which is part of my device and which includes a spring 55 fixed to the jaw connector 14, or any other convenient place, preferably by a screw 56. This spring is made to normally bear downwardly between the jaws 11 and 12, as shown. It is obvious that when the blade 13 is rotated in the course of being released from the slide, as heretofore described, the blade is pressed against the spring, forcing the spring upward, so that the moment the slide is clear of the blade and the blade released, the recoil of the spring 55 ejects the blade from the holder as it springs back to normal position. It is clear, this spring 55 also acts to hold the blade in a firmer relationship in the holding means, when the blade is in its proper operating position and held between the tongue 17 with its semi-circular end 43'' and the jaw connecting portion 14, as the tendency of the spring is to press the blade against the tongue.

In Figure 5, I show a side view of a spring member for retaining the blades in the blade clip when the clip is not in the holder. It is made

with a U-shaped portion 57 which is forced into the recess 58 provided in the blade clip as shown in Figure 4 and is retained there by its normal outward urge. The arm 59 extends over the blades and retains the blades in place in the clip. Before the clip of blades is inserted in the magazine the spring member is removed.

In the form of my knife shown, I show the magazine door 31 hinged at 60 and retained closed by a spring catch 61 which is fixed in a recess 62 by a pin 63. When it is desired to open the door, as shown by dotted lines in Figure 1, the spring catch is pushed away. It is obvious the magazine can be made with a rear entrance, if desired, such as is used in well known other blade delivery devices, without departing from the spirit or scope of my invention.

In Figures 9, 9A, 9B and 9C, I show a modification of my holding means made of a solid portion 64 with a restricted aperture 65 therethrough and mounted in a swivel-like fashion pivoted at 66 and 67 in the bifurcated arms 66' and 67' of the handle 10. The arms 66' and 67' are spaced, as shown in Figs. 9, 9B and 9C, to hold the solid portion 64 in complementary relationship therebetween so as to give even support thereto. On the handle is a slidable band 68 fixed to the handle in any convenient fashion and which is provided as a means for locking and aligning the holding means whereby the restricted aperture 65 in the member 64 forms a continuation of the restricted aperture 16 provided in the handle as clearly shown in Fig. 9B. The slide 68 frictionally engaging and locking the holding means in this position. Except for the holding means member the balance of the knife is identical to the knife shown in Figures 1 and 2. On one side of the holding means is provided an opening 69 which takes the same shape of the tongue 17 and its semi-circular member 43'' and is situated to be in alignment with the tongue and semi-circular member of the band 18 when they are in holding means position, so that when it is desired to release a blade from the holding means, the slide 68 is drawn backwards as shown in Fig. 9C (the dotted lines showing the band 68 in locked position) so as to permit the holding means to be swung around on its pivot, as shown in Figure 9A, forcing the blade out of engagement with the end of the slide as the tongue and semi-circular member passes through the opening 69. The blade is then removed from the holding means and the holding means rotated back to its proper aligned position and locked in place. While the description in connection with this modification specifies the preferred method of disengaging the blade from the slide, it is very clear that in this type of holding means as well as in the other types described in this specification, the slide could be made long enough to project a blade from the front end of the holding means without departing from the spirit of the invention.

The invention is illustrated in a magazine knife, but I do not wish to be confined to this alone as it is obvious the features I disclose herein are applicable in numerous devices and other arrangements of parts may be devised without departing from the scope of my invention as set forth. The invention, therefore, fully anticipates such equivalent motions and mechanisms as will bring about equivalent results.

Having thus described my invention, what I claim as a new article of manufacture is:

1. A knife comprising, a handle, a magazine adapted to hold a stack of blades insertable therein and removable therefrom, a holding means on said handle for holding a blade projecting beyond the front thereof and into which the blades are projected one at a time, means for positively feeding a blade from the stack into the holding means, said feeding means having an engaging portion for interlocking with a blade for moving said blade in a plurality of directions, and said magazine including means cooperative with means forming part of the blade and means in the holding means for releasing a blade from said feeding means.

2. A knife comprising, a handle, a magazine adapted to hold a stack of blades insertable therein and removable therefrom, a holding means on said handle into which the blades are projected one at a time, a restricted passage through which the blades are fed, means for positively feeding a blade from the stack into the holding means, said feeding means and the blade having cooperative engaging portions for locking with each other and for disengaging from each other.

3. In a magazine knife having a handle, a blade holding means on said handle, a restricted blade passage for the passing of a blade at a time from the magazine into the holding means, a magazine adapted to hold a stack of blades, a blade feeding means including a slide having its end engage and interlock the end of a blade adapted therefor, said slide feeding said blade from the magazine into the holding means and retaining its locked relationship therewith and means for causing the separation of said blade and slide when the blade is released from the holding means.

4. A knife comprising a longitudinally extended handle, a magazine adapted to hold a plurality of blades, a slide in said handle movable substantially longitudinally with respect to the longitudinal plane of said handle, for projecting a blade at a time from the magazine, said slide having a tongue projecting therefrom parallel to the longitudinal plane of the slide for interlocking with a blade having a recess shaped to receive the tongue, said tongue being immovable with respect to said slide.

5. A knife comprising a magazine adapted to hold a plurality of blades, a slide for projecting a blade at a time endwise from the magazine, said slide having a tongue projecting therefrom for engaging with a blade adapted to receive the tongue, said tongue being immovable with respect to said slide and the knife having means for releasing said immovable tongue from the blade.

6. A knife comprising, a handle, a blade holding means, a magazine adapted to hold a stack of blades insertable and removable in said magazine, positive means for feeding blades in succession from the stack into the holding means, and said last means including a slide having a member on its end for engaging with a blade adapted to receive said member to move the blade forwardly, rearwardly and obliquely.

7. A knife comprising, a magazine adapted to hold a stack of blades therein, a blade holding means, means for projecting a blade at a time from the magazine into the holding means, and means for redelivering the blade from the holding means back into the magazine.

8. A knife comprising, a magazine adapted to hold a stack of blades therein, a blade holding means, means for projecting a blade at a time from the magazine into the holding means, and

means for redelivering the blade from the holding means back into the magazine onto the stack therein.

9. A knife comprising, a substantially longitudinally extending handle, a magazine adapted to hold a plurality of blades, a blade holding means forming part of the longitudinally extending handle and having means therein for positively holding a blade projecting beyond its front end in a substantially longitudinally parallel relationship to the longitudinal plane of said handle, a restricted passage through which a blade at a time is fed from the magazine into the holding means, means for projecting a blade at a time from the magazine into the holding means, and means for ejecting said blade from said holding means.

10. A knife comprising, a magazine adapted to hold a plurality of blades, a blade holding means having a slot therein for receiving the blade, means for projecting a blade at a time from the magazine into the holding means, and said holding means including means for ejecting said blade therefrom.

11. A knife comprising, a handle with a blade holding means thereon, a magazine adapted to hold a stack of blades, a restricted passage through which the blades are fed from the magazine into the holding means, a slide for projecting a blade at a time from the magazine into the holding means, the slide and blade having cooperating engaging members, the knife including means for holding said engaging members in interlocked relationship by which the blade is firmly and securely held in a predetermined aligned position.

12. In a blade delivery device having a blade holding means and a magazine adapted to hold blades, a slide for projecting a blade at a time from the magazine into the holding means, means by which said blade is held in a predetermined position by the slide, and means for moving said blade obliquely out of engagement with the slide.

13. A blade delivery device comprising, a longitudinally extending handle, a magazine adapted to hold blades connected thereto, a blade holding means, means for locking said blade holding means in longitudinally parallel relationship to the longitudinal plane of said handle, means for rotating said holding means in relation to said handle, and means for feeding a blade at a time from said magazine into said blade holding means.

14. In a magazine knife having a restricted blade passage in its handle through which only a blade at a time can be passed, a blade holding means for holding a blade in operative position, a magazine adapted to hold a stack of blades and a means for feeding a blade at a time from the magazine into said holding means, said restricted passage having a movable means therein for holding said blade in alignment.

15. In a blade delivery device comprising a magazine adapted to hold a clip of separate blades, a slide for projecting a blade at a time from the magazine, said slide having a tongue projecting therefrom parallel to the longitudinal plane of the slide for engaging with a blade having a recess shaped to receive the tongue in complementary relationship thereto so that said blade is held firmly and securely in a predetermined aligned position thereby, and said blade clip being shaped in its rear portion to provide a holding means engaging in complementary relationship in the recesses of a stack of blades for holding said blades firmly and securely in an aligned position independent of the remainder of said clip.

16. A knife comprising a magazine which constitutes a substantially longitudinally extending handle, the magazine being adapted to receive a stack of blades, a blade holding means forming one of the closure ends of said magazine, and a means for successively feeding blades from the stack into the holding means, the holding means having a slit therein for receiving a blade as it is fed therein, said slit being the outlet aperture for the feeding of blades from the magazine, and said slit having means therein for positively holding a blade projected therefrom in a substantially longitudinally parallel relationship to the longitudinal plane of the handle.

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