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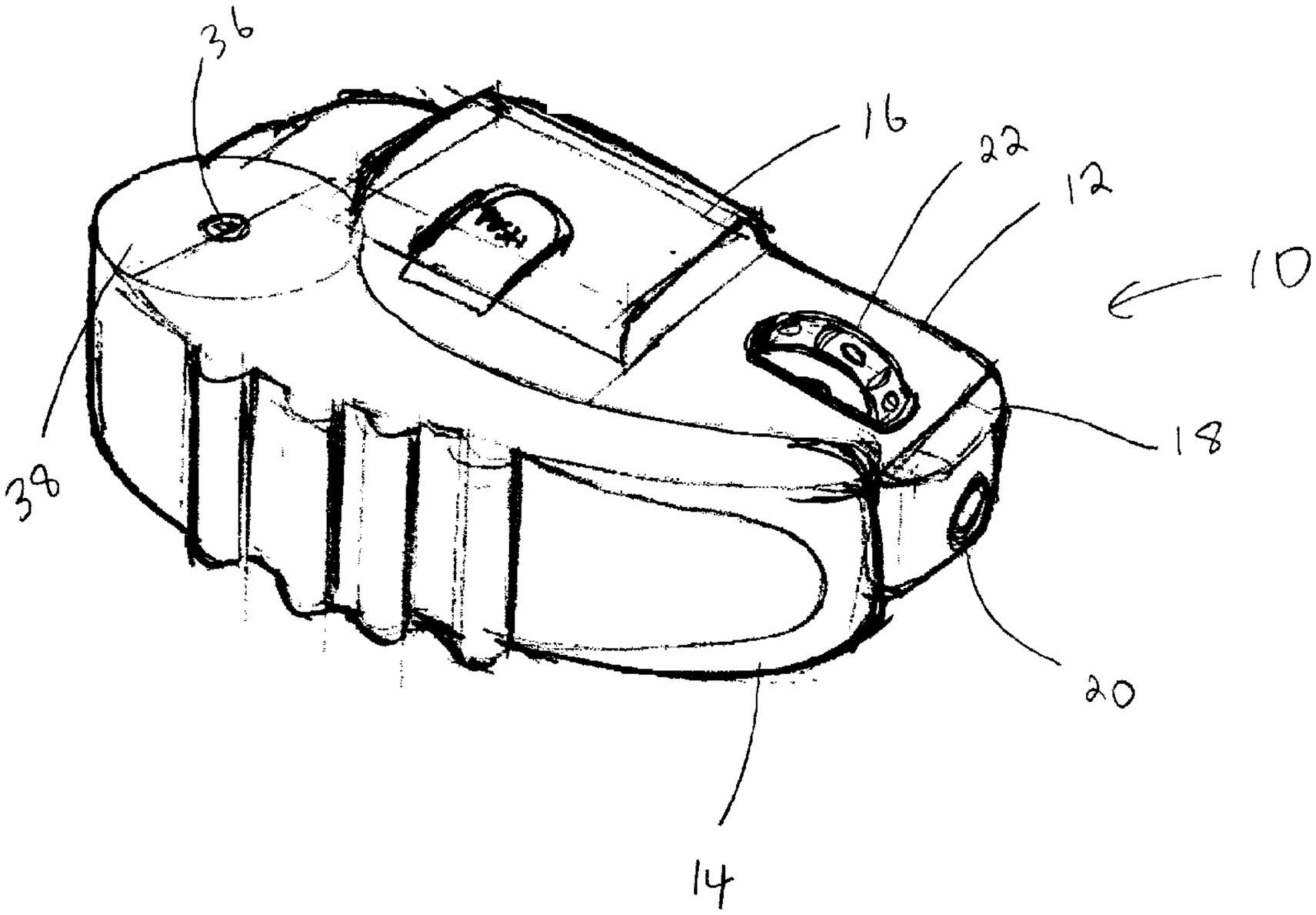
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(54) Title: MAGNETIC SCREWDRIVER



(57) Abrégé/Abstract:
A screwdriver device for applying torque to a screw or other fastener is disclosed. The device has a handle with a chuck located on one end of the handle. The handle has a housing which contains an elongated channel which is configured to receive one end of a fastener bit. The chuck also has a magnetic member which is moveably mounted to the housing between a first position wherein the magnetic member makes magnetic contact with the bit contained in the channel and a second position wherein the magnetic member does not make magnetic contact with the bit. The magnetic member preferably consists of a magnet mounted to a non-magnetic member. The non-magnetic member is moveably mounted to the chuck housing such that a portion of the non-magnetic member is position adjacent the handle permitting the user to move the member between it's first and second position. Preferably the non-magnetic member is pivotally mounted to the housing such that the magnet is coaxial with the channel when the magnet is in it's first position.

Abstract

A screwdriver device for applying torque to a screw or other fastener is disclosed. The device has a handle with a chuck located on one end of the handle. The handle has a housing which contains an elongated channel which is configured to receive one end of a fastener bit. The chuck also has a magnetic member which is moveably mounted to the housing between a first position wherein the magnetic member makes magnetic contact with the bit contained in the channel and a second position wherein the magnetic member does not make magnetic contact with the bit. The magnetic member preferably consists of a magnet mounted to a non-magnetic member. The non-magnetic member is moveably mounted to the chuck housing such that a portion of the non-magnetic member is position adjacent the handle permitting the user to move the member between it's first and second position. Preferably the non-magnetic member is pivotally mounted to the housing such that the magnet is coaxial with the channel when the magnet is in it's first position.

FIELD OF THE INVENTION:

The invention relates generally to screwdrivers having a magnetic chuck.

BACKGROUND OF THE INVENTION:

Multi bit screwdrivers or nut drivers are well known in the art. These tools generally consist of a handle portion having a chuck at one end which is adapted to releaseably attach an interchangeable bit. The handle portion often contains a chamber for storing several different bits. The chuck mechanism usually consists of some mechanical mechanism of locking the bit into place so that it is secure and can not be removed accidentally. Two common locking mechanisms are employed. The first locking mechanism generally comprises a tubular sleeve having length wise extending slots and an outside threaded surface. A tapered nut is generally threaded onto the outside surface of the sleeve. A bit may be secured in the sleeve by twisting the nut onto the sleeve causing the inside diameter of the sleeve to decrease, thereby firmly gripping the bit. The other locking mechanism generally consists of a metal sleeve having internally disposed spring loaded ball bearings. The bits are each provided with indentations on one end thereof which permit the ball bearings to lock into the indentations when the bit is forced into the sleeve.

Both prior art chuck assemblies are adequate for securing bits to a screwdriver or similar tool. However, existing locking mechanisms require either significant force to be applied to the bit to insert it and remove it from the tool or require a series of complicated manual maneuvers, such as

unscrewing or screwing a nut or similar device. As a result, the tool users must physically handle the bits in order to insert them or remove them for the tool. Since handling the bits may be difficult or awkward if gloves are worn by the user, there is the real possibility that the bits may fall out of the users hands and lost. There is a need for a multi bit tool which permits the user to change bits without the need to handle them.

SUMMARY OF THE INVENTION:

The present invention is a screwdriver/nut driver device for applying torque to a screw or bolt or other fastener, the device having a handle and a magnetic chuck mounted to the handle. The magnetic chuck has a housing with an elongated channel which is configured to receive a first end of a bit. The chuck also has a magnetic member which is moveably mounted to the housing and which is moveable between a first position wherein the magnetic member can make magnetic contact with the bit contained in the channel and a second position wherein the magnetic member does not make magnetic contact with the bit.

BRIEF DESCRIPTION OF THE DRAWINGS:

FIGURE 1: is a perspective view of a multi bit tool made in accordance with the invention and showing the handle in its closed position and also showing the bit retainer compartment attached to the tool.

FIGURE 2: is a perspective view of a multi bit tool made in accordance with the present invention

showing the bit holder removed from the tool body.

FIGURE 3: is a perspective view of a multi bit tool made in accordance with the present invention showing the handle in its open position.

FIGURE 4: is a cross sectional view of the multi bit tool made in accordance with the present invention showing the coupling mechanism in its first position.

FIGURE 5: is a cross sectional view of a multi bit tool made in accordance with the present invention showing the coupling mechanism in its second position.

FIGURE 6: is an alternate embodiment of the present invention showing the handle in its closed position.

FIGURE 7: is a cross sectional view of an alternate embodiment of the present invention showing the coupling mechanism in its first position and a bit inserted into the tool.

FIGURE 8: is a cross sectional view of the present invention showing the coupling mechanism in its first position, the bit coupled to the tool and the bit holder removed from the bit.

FIGURE 9: is a cross sectional view of an alternate embodiment of the present invention showing the coupling mechanism in its second position.

DETAILED DESCRIPTION OF THE INVENTION:

Referring firstly to figure 1, a multi bit tool made in accordance with the present invention shown generally as item 10 consists of housing 12 having a pivotally attached handle 14, a bit storage compartment 16 mounted onto housing 12, a bit retaining portion 18 having a opening 20 through which a tool bit may be inserted and a bit locking mechanism 22. Lever handle 14 is pivotally

attached to housing 12 at end 38 of the handle via pivotal attachment 36.

Referring now to figure 2, bit storage compartment 16 comprises a housing which is adapted to holding a plurality of bits 24 such that ends 42 of the bits protrude out of the housing. Storage compartment 16 has attachment element 30 which corresponds to attachment element 32 in the tool. Housing 12 has portion 34 which contains a compartment 28 which is dimensioned to receive bit storage compartment 16. Preferably, attachment elements 30 and 32 are tongue and groove connectors dimensioned to securely retain storage compartment 16 within chamber 28 of housing 12. Compartment 16 has locking mechanism 40 which is adapted to lock compartment 16 to housing 12 when the compartment is inserted into chamber 28.

Referring now to figure 3, handle 14 is pivotally mounted to housing 12 at pivot point 36 such that the handle may be pivoted away from housing 12 from a first position (as seen in figure 1) to a section position as shown in figure 3. It will be appreciated that when handle 14 is in its second position, the tool user can apply more torque since the effective width of the tool is increased.

Referring now to figure 4, coupling mechanism 22 comprises a rotatable member 44 which is rotatably mounted to housing 12 at point 48. Rear earth magnet 46 is mounted within rotatable member 44 such that it can be alined with opening 20 of end portion 18 of the tool. Opening 20 is dimensioned to receive end 42 of bit 24. End 18 is provided with metal retainers 50 and 52 which have central openings 51 and 53 respectively. Central openings 51 and 53 of metal retainers 50 and 52 are dimensioned and configured to permit end 42 of bit 24 to pass there through and to restrain

rotation of bit 42. Preferably apertures 51 and 53 of metal retainers 50 and 52, respectively, are hexagonal and correspond to the hexagonal profile shape of end 42 of bit 24. Bit 24 is stored in storage compartment 16 such that tool end 60 of the bit is retained in storage compartment 16 while opposite end 42 of the bit protrudes outside of the compartment. The interior of compartment 16 is filled with high density foam 54 which is adapted to grip outside surface 62 of bit 24 with sufficient friction to prevent bit 24 from dislodging from the compartment.

The operation of coupling mechanism 22 will now be described with reference to figures 4 and 5. To insert bit 24 into the tool, bit storage compartment 16 is positioned in front of the tool such that end 42 of bit 24 can be inserted into opening 20 of front portion 18 of the tool. When end 42 of bit 24 is fully inserted into opening 20, rare earth magnet 46 magnetically engages end 42 of the bit. Rare earth magnet 46 is sufficiently strong to firmly retain end 42 of bit 24 in opening 20. When bit 24 is fully inserted into opening 20, the tool is then moved away from bit storage compartment 16 such that end 60 is pulled out of the compartment. Rare earth magnet 46 is sufficiently strong to overcome the frictional force associated with pulling bit 24 out of compartment 16. Therefore, it is possible to insert bit 24 into the tool without the user having to touch bit 24.

As seen in figure 5, member 44 can be rotated by a user by action of the users thumb. When member 44 is rotated from its first position as seen in figure 4 to its second position as seen in figure 5, rare earth magnet 46 is disengaged from end 42 of bit 24, thereby breaking the magnetic force restraining the movement of bit 24. To remove bit 24 from the tool, compartment 16 is positioned relative to the tool such that end 60 of bit 24 is inserted into cavity 58 in high density foam 54. The frictional

force of surface 56 of high density foam 54 pressing against outer surface 62 of bit 24 causes the high density foam to grip end 60 of the bit permitting the bit to be removed from the tool after member 44 is moved into its second position. Therefore, bit 24 can be removed from the tool and neatly placed in storage compartment 16 without the user having to touch the bit.

An alternate embodiment of the present invention is shown in figure 6 and comprises housing 112, handle 114, having end 138 which is pivotally attached to housing 112 at pivot point 136. Tool 100 also has bit compartment 116, front portion 118, opening 120 and bit retaining mechanism 122. Handle 114, and storage compartment 116 of tool 100 are identical to handles 14 and compartment 16 of tool 10 as shown in figure 1.

Referring now to figure 7, bit coupling mechanism 122 consists of a moveable member 164 having rare earth magnet 166. Moveable member 164 is retained in chamber 162 of housing 112. Moveable member 164 is moveable between a first position as shown in figure 7 and a second position as shown in figure 9. Biasing spring 168 biases moveable member 164 towards its first position. By moving moveable member 164 from its first position to its second position, end 146 of bit 124 can be either magnetically coupled within opening 120 or decoupled, respectively. Housing 112 is also contains metal retainers 156 and 158 which are adapted to receive end 146 of bit 124 and prevent rotation of bit 124. Metal retainers 156 and 158 are identical to metal retainers 150 and 152 shown in figure 4.

The operation of coupling mechanism 122 will not be described with reference to figures 7, 8 and 9.

When bit 124 is to be attached to the tool, bit storage compartment 116 containing bit 124 is

positioned such that end 146 can be inserted into opening 120. End 146 comes into magnetic contact with rare earth magnet 166 of coupling mechanism 122. As seen in figure 8, compartment 116 may then be pulled away from bit 124. The magnetic force exerted by rare earth magnet 166 is sufficient to overcome the frictional force which is applied to surface 154 of the bit by high density foam 150. When bit 124 is to be removed from the tool, bit storage compartment 116 is positioned such that end 148 of the bit can be inserted into corresponding recess 152 in high density foam 150. Recess 152 is dimensioned such that foam 150 makes frictional contact with surface 154 of bit 124. Once end 148 is fully inserted into high density foam 150, moveable member 154 is moved into its second position, as shown in figure 9, and end 146 is no longer magnetically retained within opening 120. By pulling back on bit storage compartment 116, the frictional force between high density foam 150 and surface 154 of bit 124 is sufficient to pull the bit out of opening 120. Member 140 as seen in figure 6 is rigidly attached to member 164 such that when the user presses on member 140 with his/her thumb, moveable member 164 is moved from its first position to its second position. As soon as the user removes his thumb from member 140, spring 168 moves moveable member 164 from its second position back into its first position.

CLAIMS:

1. A device for applying torque to a fastener comprising:

- A handled;
- A chuck located on the handle;
- The chuck having a housing with an elongated channel configured to receive a first end of a bit, and
- A magnetic member movably mounted to the housing and movable between a first position wherein the magnetic member can make magnetic contact with the bit contained in the channel and a second position wherein the magnetic member does not make magnetic contact with the bit.

2. A device as defined in claim 1 wherein the magnetic member comprises a magnet mounted to a movable member, the movable member made of a non-magnetic material.

3. A device as defined in claim 2 wherein the movable member is mounted within the housing of the chuck such that a portion of the movable member is positioned adjacent the handle to permit a user to move the magnet between its first and second positions.

4. A device as defined in claim 3 wherein the movable member is pivotally attached to the housing and is pivotally movable between a first position wherein the magnet is adjacent the channel and a second position where the magnet is positioned away from the channel.

5. A device as defined in claim 3 wherein the movable member is slidingly mounted to the chuck housing and is movable between a first position wherein the magnet is adjacent the channel and a second position wherein the magnet is positioned away from the channel.

6. A device as defined in claim 4 wherein the movable member is pivotally mounted to the chuck housing and is movable between a first position where the magnet is coaxial to the channel and a second position where the magnet is positioned to the side of the channel.

7. A device as defined in claim 5 wherein the movable member is slidingly attached to the chuck housing and is movable between a first position where the magnet is coaxial to the channel and a second position where the magnet is positioned to the side of the channel.

8. A device as defined in claim 1 wherein the chuck housing is made of a non-magnetic material.

9. A device as defined in claim 1 further comprising a bit storage compartment for storing at least one bit, said bit storage compartment having a recess with an internal wall, said recess configured to snugglely receive a second end of the bit, the inside wall of the recess adapted to exert a frictional force on the bit sufficient to retain the bit within the recess.

10. A device as defined in claim 9 wherein the compartment is releaseably attachable to the handle.

11. A device as defined in claim 1 wherein the magnetic member is coaxially positioned with the channel when the magnetic member is in it's first position, the member being non-coaxially positioned relative to the channel when the magnetic member is in it's second position.

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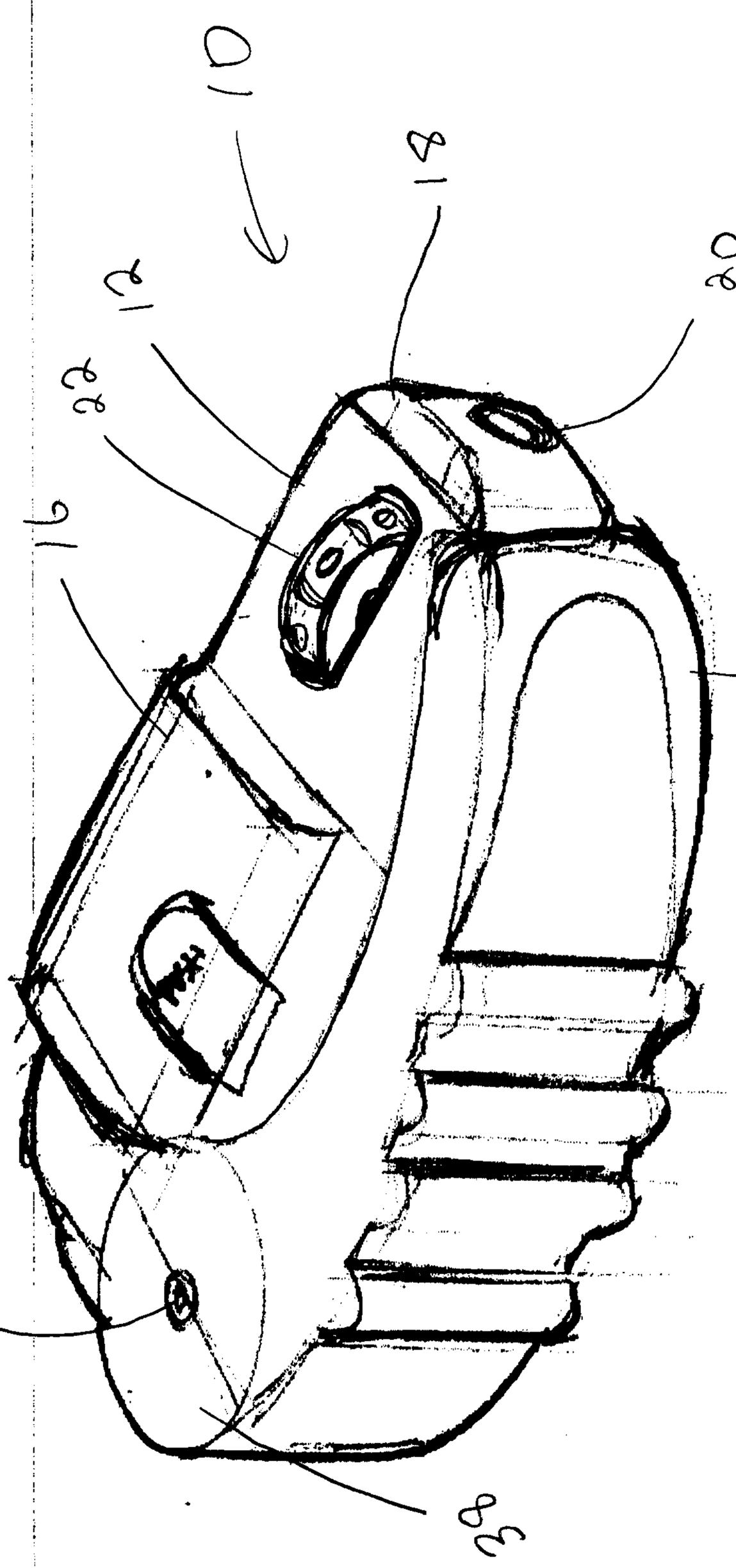


Fig. 1

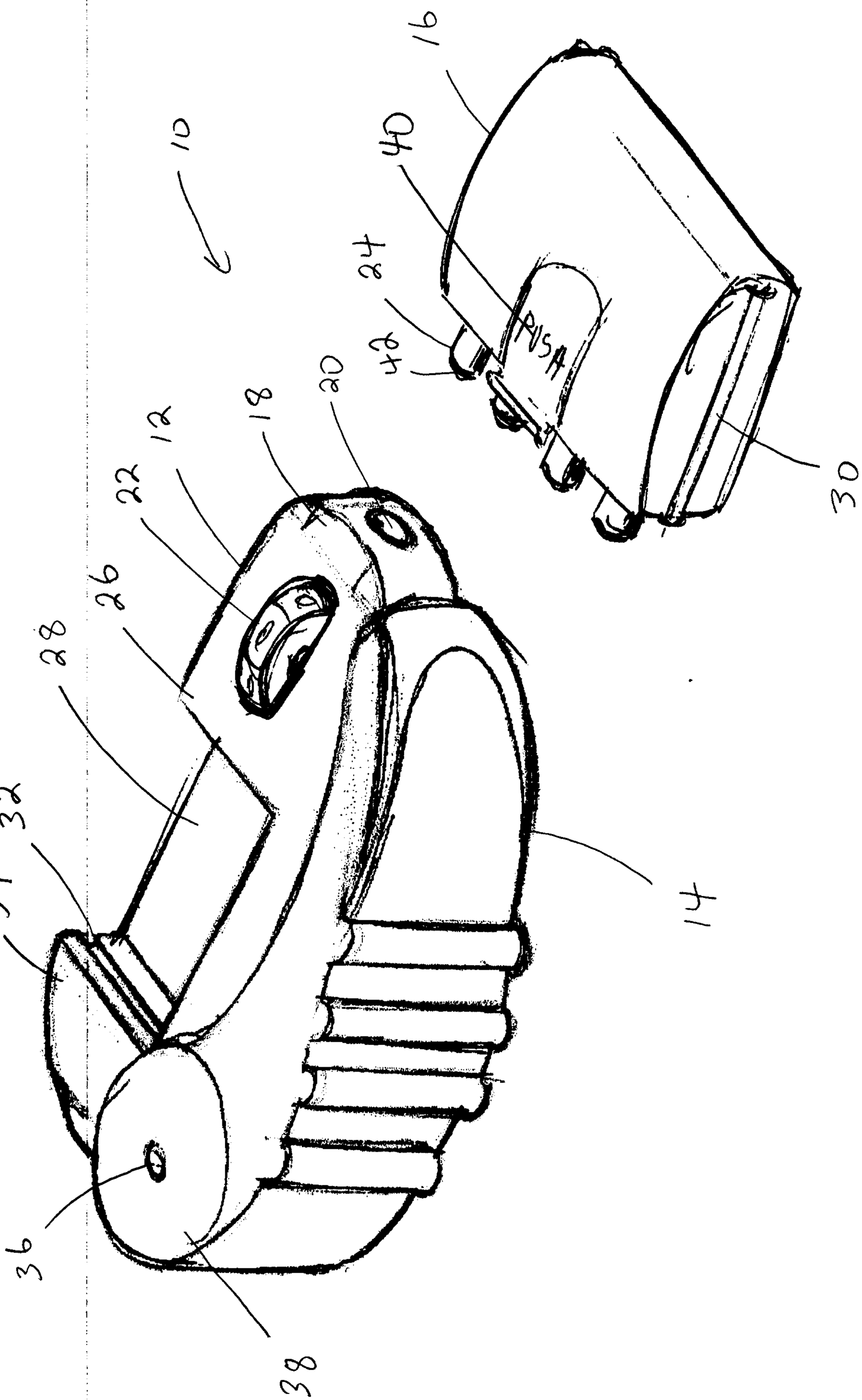


Fig 2.

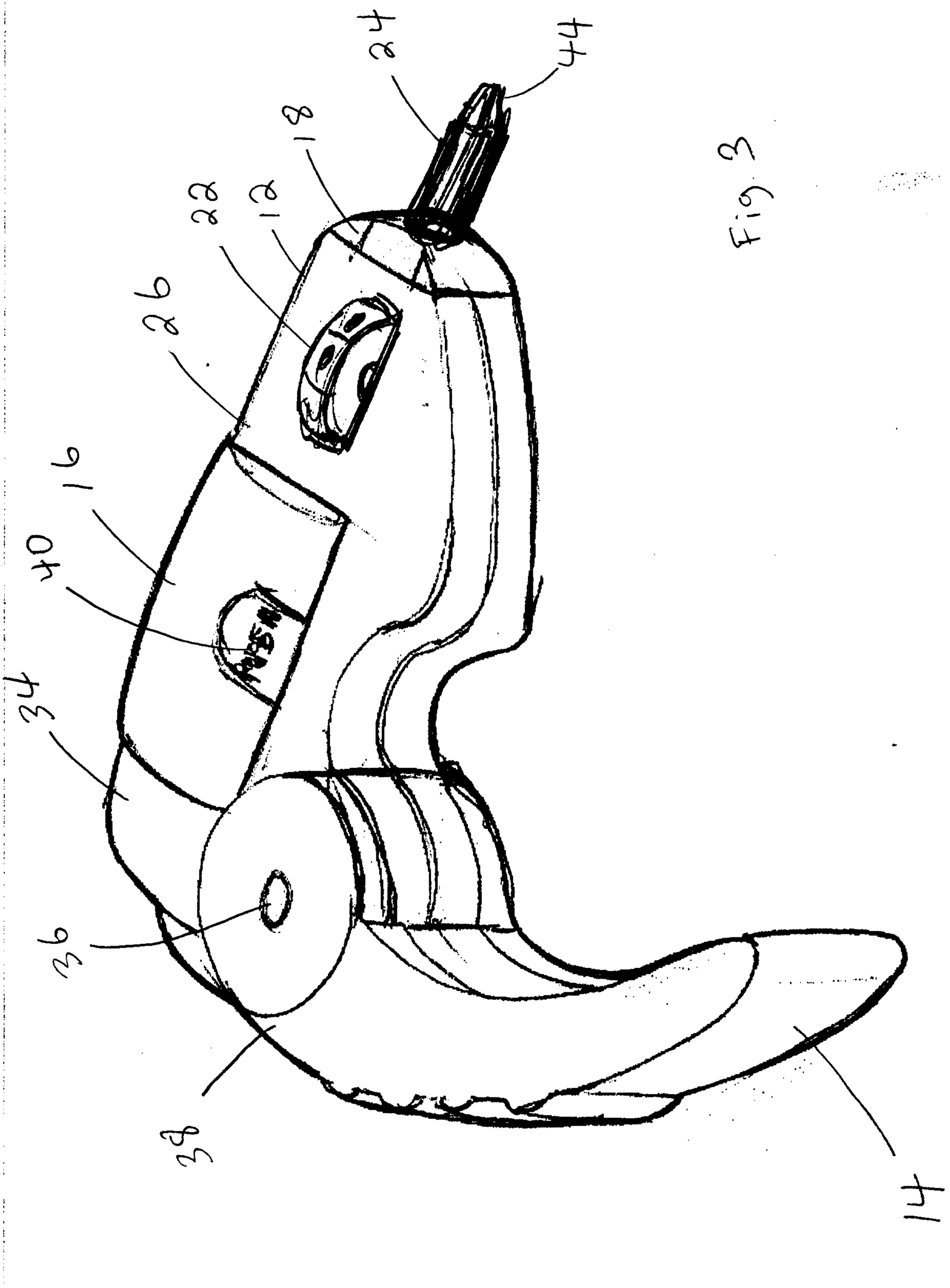


Fig 3

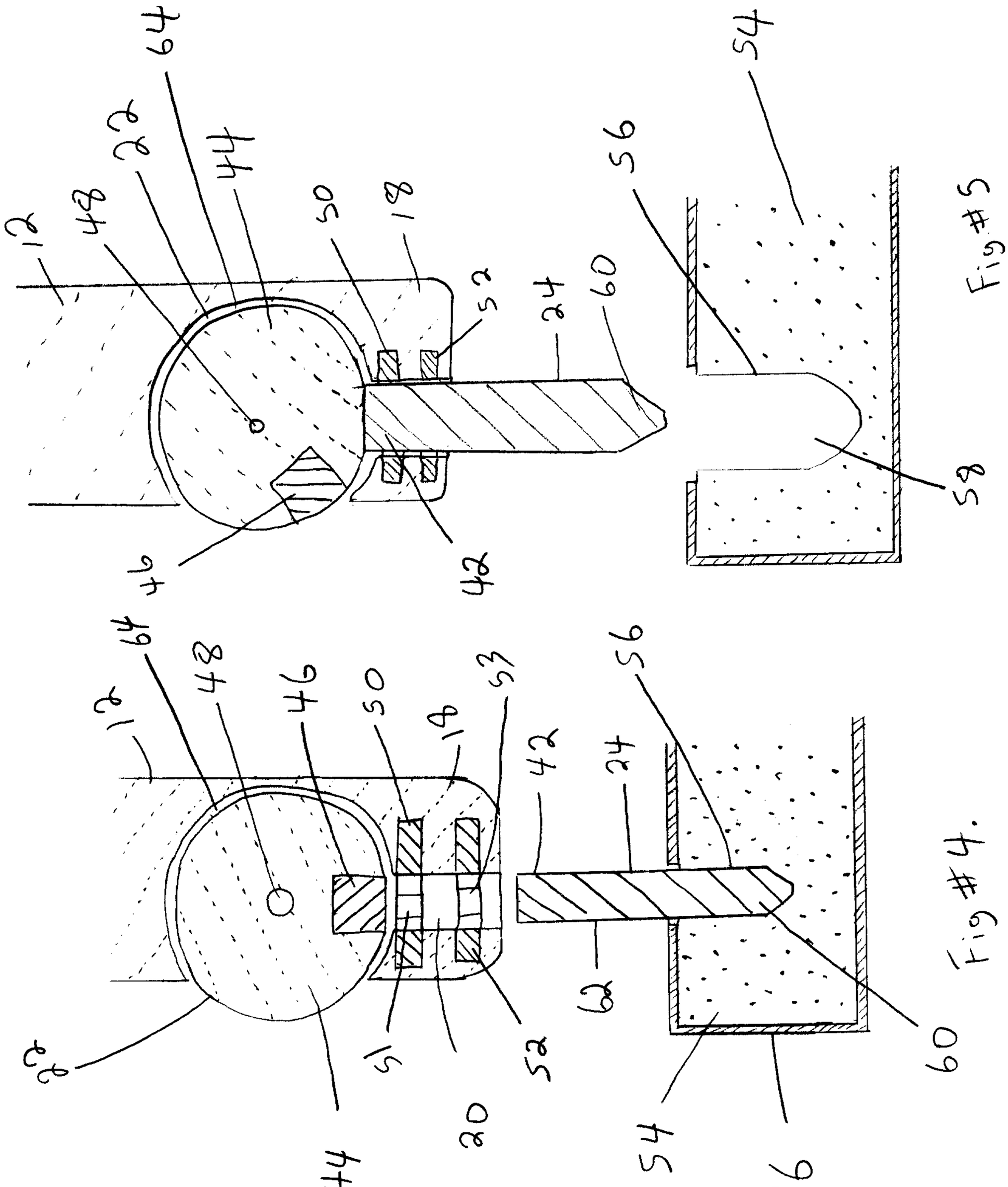


Fig #5

Fig #4.

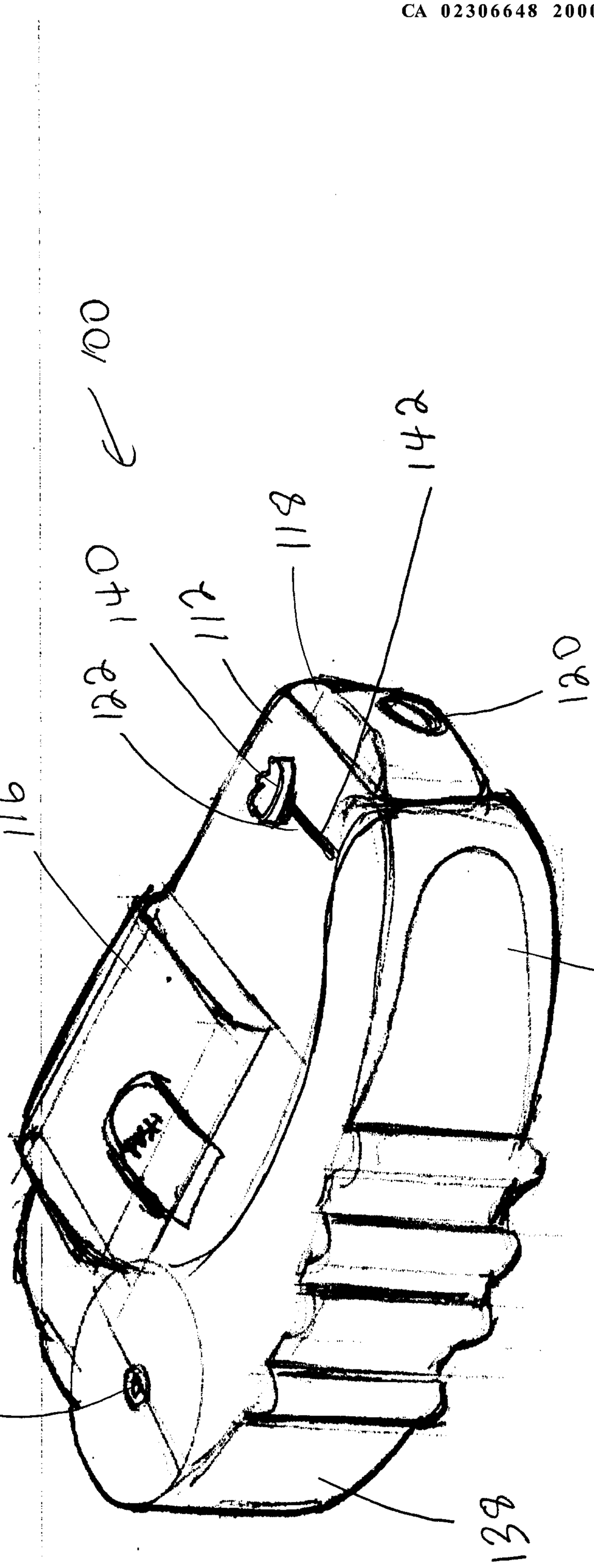


Fig 6.

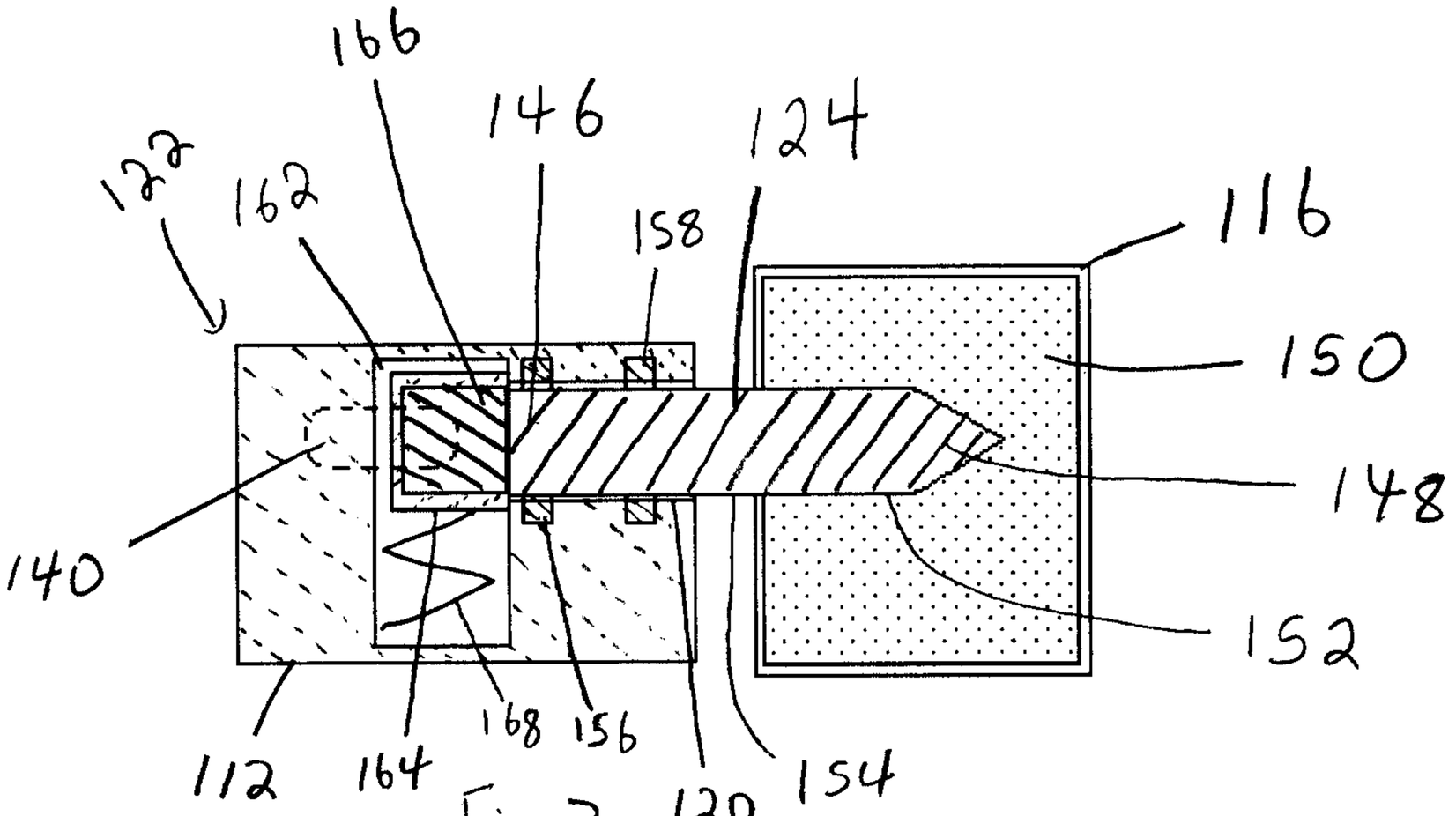


Fig 7.

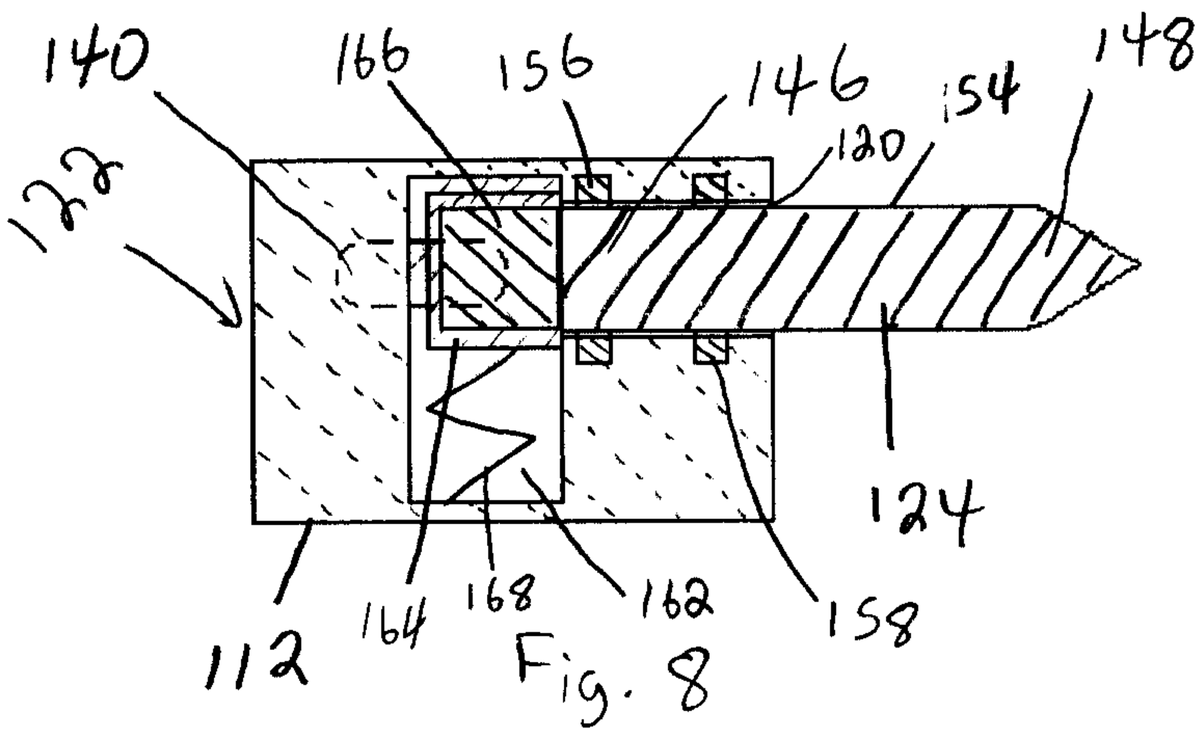
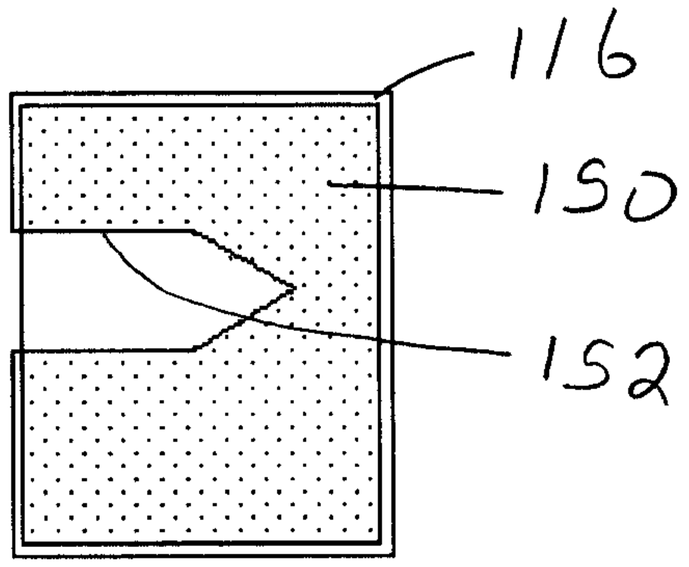


Fig. 8



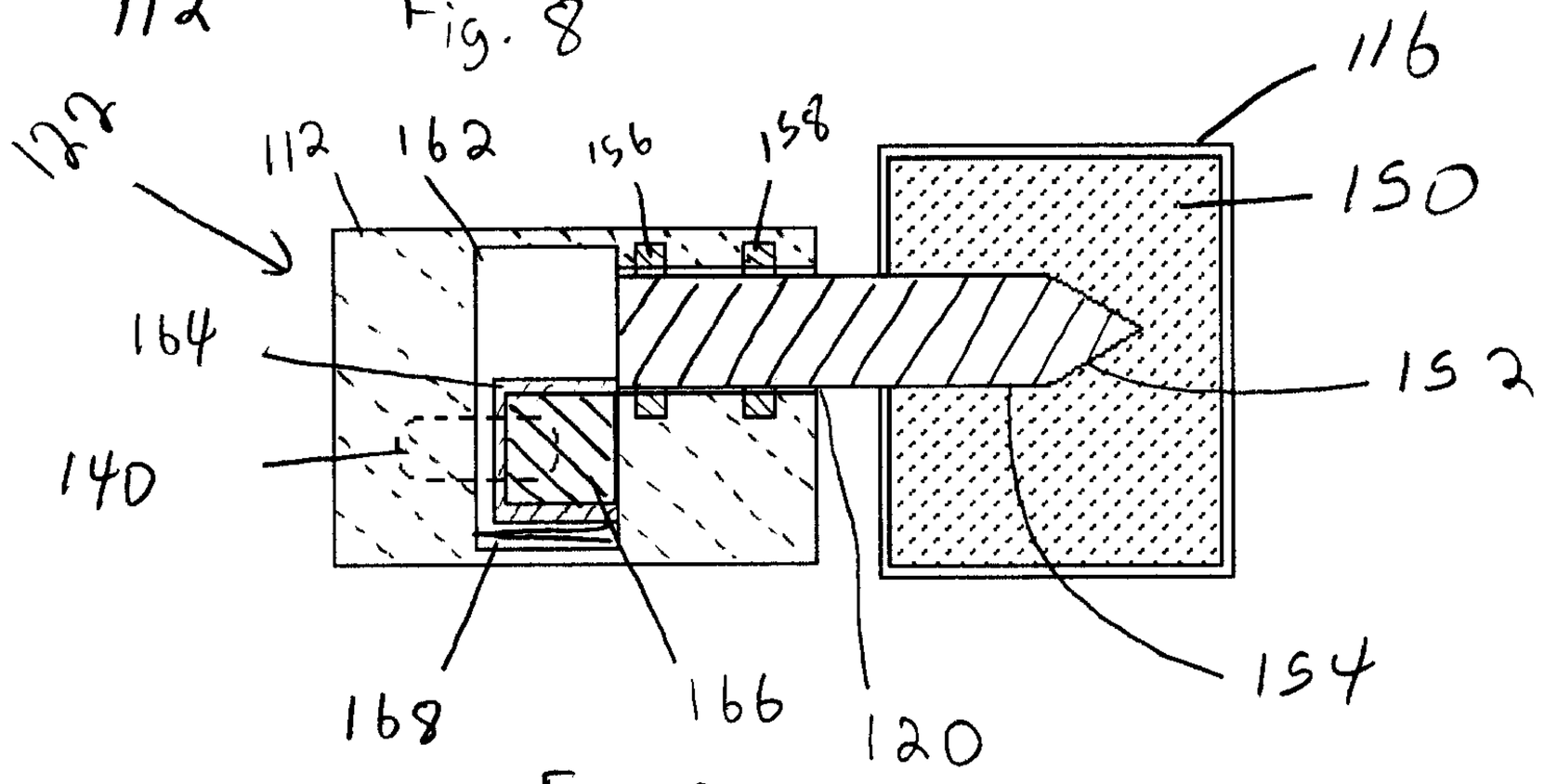
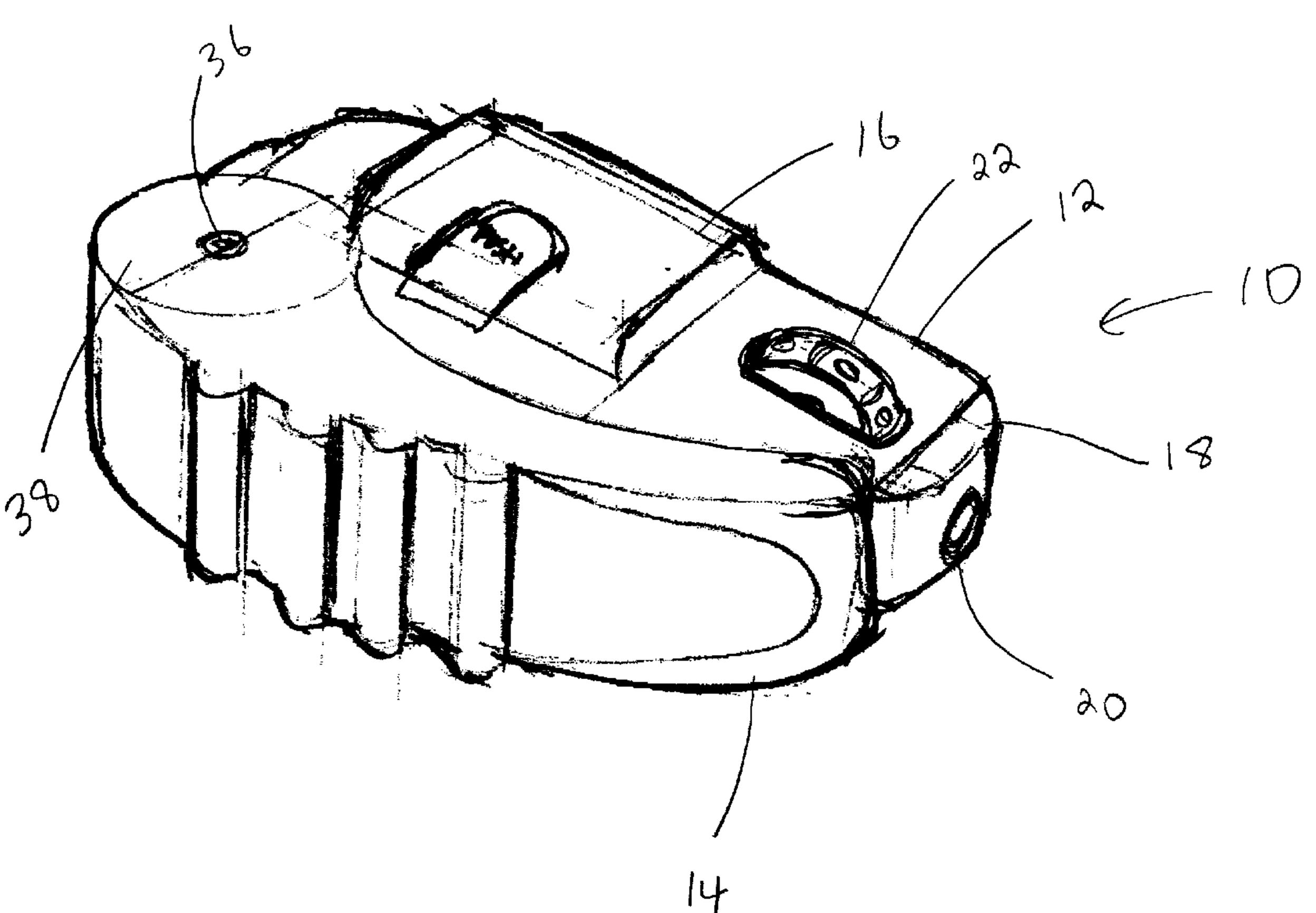


Fig 9.


36
16
22
12
10
18
38
20
14