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Dobrosielski

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[45] **May 20, 1975**

[54] **SCREWDRIVER WITH INTEGRAL MAGNETIC SCREW STARTER**

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[52] **U.S. Cl.** ..... **145/50 DA;** 81/125

[51] **Int. Cl.** **B25b 15/00**

[58] **Field of Search** ..... 145/50 DA, 50 C; 81/125

[56] **References Cited**

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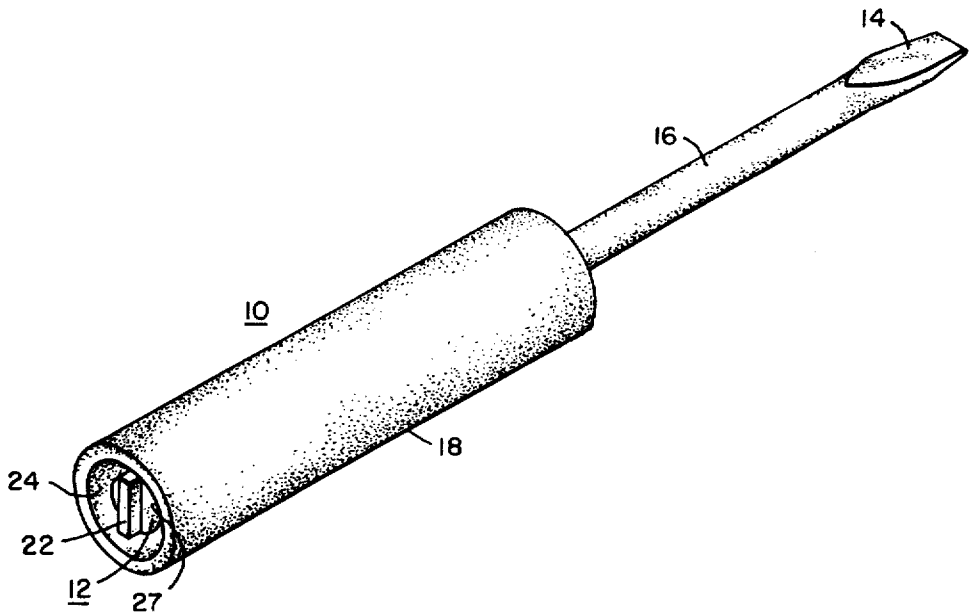
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Assistant Examiner—Marc R. Davidson
Attorney, Agent, or Firm—Howard G. Massung

[57] **ABSTRACT**

A screwdriver having an integral magnetic screw starter to accommodate the same size and type of screws as the cooperative screwdriver head. The driver head of the magnetic screw starter matches the associated driver head of the screwdriver size and type. The magnetic screw starter comprises a high magnetic strength permanent magnet for securely holding the screw to be started. In one embodiment the magnetic screw starter is constructed with a magnetic starterhead having an area comparable in size to the screw to be started, and a slightly raised portion for engaging the slot in the head of the screw to be started. The magnetic screw starter is recessed in the screwdriver handle for protection and for limiting the size of screw which it can accommodate. The disclosed construction provides a magnetic screw starter for securely holding selected size and types of magnetizable fasteners. The teaching of this invention can be applied to screwdrivers having various type of heads such as clutch, Phillips, socket, hex, or the like. The recess in the screwdriver handle and the diameter of the permanent magnet can provide additional help for supporting the screw to be started.

7 Claims, 6 Drawing Figures



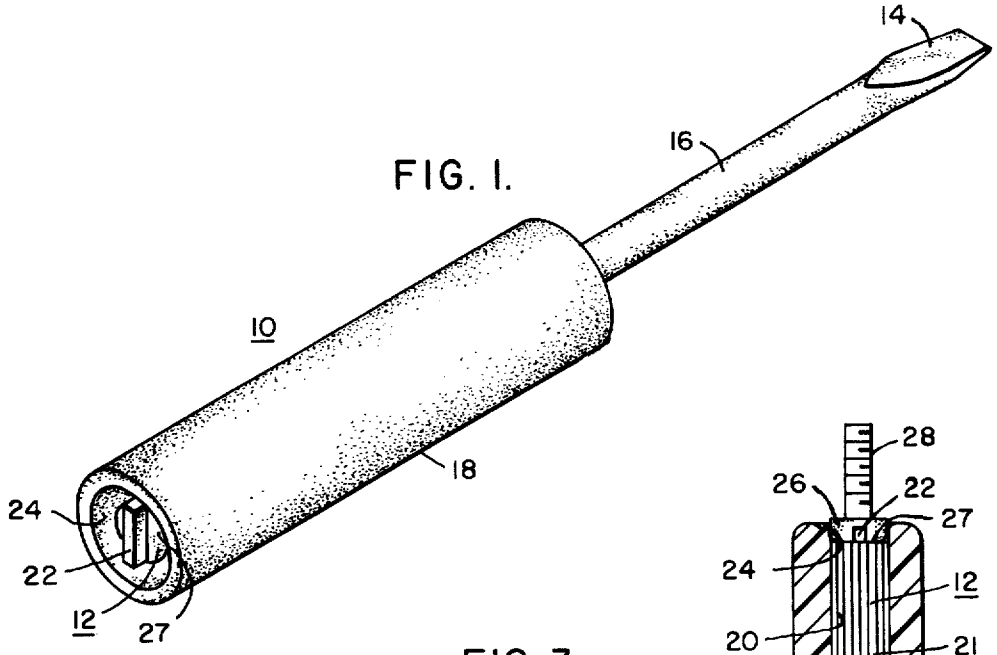


FIG. 1.

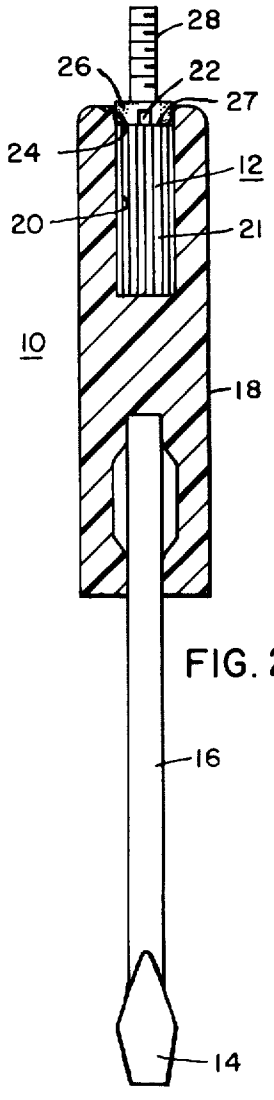


FIG. 2.

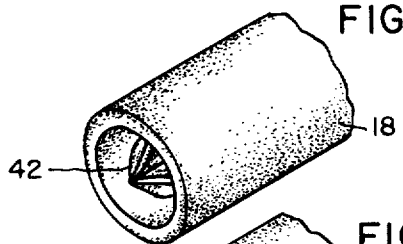


FIG. 3.

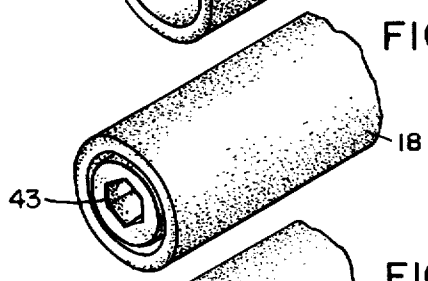


FIG. 4.

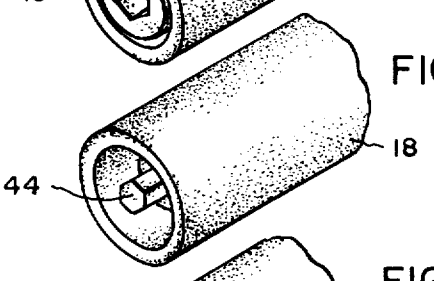


FIG. 5.

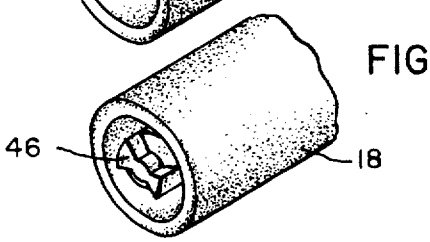


FIG. 6.

SCREWDRIVER WITH INTEGRAL MAGNETIC SCREW STARTER

BACKGROUND OF THE INVENTION

This invention relates to screwdrivers and more particularly to a screwdriver having an integral magnetic screw starter.

Prior art mechanical screw starters are difficult and expensive to manufacture and cannot be used on all varieties of screws, such as, a screw having a non-removable type head which prevents the screw from being backed out after insertion. Prior art screwdrivers having a magnetized primary driver head tend to have a low holding force and have difficulty in holding long screws or screws having special heads, such as the non-removable variety. The steels required for a general purpose screwdriver head generally do not have the necessary properties for a high strength permanent magnet. A high quality permanent magnet can be made from a hard, high carbon steel, but this is too brittle and not acceptable for a general purpose screwdriver head.

SUMMARY OF THE INVENTION

A screwdriver having an integral magnetic screw starter which can accommodate selected varieties and sizes of fasterners is provided. The screw starter is constructed to be used in cooperation with the primary screwdriver head for securing the selected fastners to a workpiece.

The screwdriver, with integral magnetic screw starter, comprises a shank, with a primary driver formed at the free end thereof, extending from one end of an elongated handle, and a magnetic screw starter attached to the other end of the handle. The screw starter is formed from a high magnetic strength permanent magnet. The screw starter has a driver head constructed to match the primary driver in the size and type of screw accommodated. The magnetic screw starter can be recessed in the handle for protection against mechanical damage and to limit the size of fastener to which it can be applied. The opening into which the screw starter is recessed can also be used for providing support for some screws. The driver of the magnetic screw starter projects only slightly above the magnetic body, from which it is formed, providing a strong holding force; since the body of the magnet can directly contact a large portion of the head of the screw to be retained.

The disclosed screwdriver having an integral magnetic screw starter is simple and inexpensive to manufacture. It can be built for all sizes and types of screwdrivers, with each magnetic screw starter head matching the associated primary screwdriver head. The body of the starter in contact with the screw head provides a strong holding force and can easily hold long screws having heads of the non-removable variety, which cannot be held securely by prior art magnetic screwdrivers.

It is an object of this invention to provide a magnetic screw starter, having superior magnetic holding force, recessed in an opening in a handle which provides mechanical protection and limits the size and type of screws which can be accommodated.

It is a further object of this invention to provide a screwdriver having a magnetic screw starter, formed integral therewith opposite the primary screwdriver head, constructed to accommodate the same size and type of screw as the primary screwdriver head.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention reference may be had to the preferred embodiment exemplary of the invention shown in the accompanying drawings in which:

FIG. **1** is a perspective view of a screwdriver utilizing the teaching of the present invention;

FIG. **2** is a side sectional view of a screwdriver utilizing the teaching of the present invention;

FIG. **3** is a side view of a portion of a screwdriver for Phillips head screws utilizing the teaching of the present invention;

FIG. **4** is similar to FIG. **3**, but for a hex head fastener;

FIG. **5** is similar to FIG. **3**, but, for a socket head fastener; and

FIG. **6** is similar to FIG. **3**, but for a clutch head fastener.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings and FIGS. **1** and **2** in particular there is shown a screwdriver **10** utilizing the teaching of the present invention. The screwdriver **10** has an integral magnetic screw starter **12** which can accommodate the same size and type of fastener as the primary driver head **14**. As in a conventional screwdriver the driver head **14** is located on the free end of a shank **16** extending from one end of an elongated handle **18**. Shank **16**, which is normally formed from a steel material having a relatively high structural strength, is securely connected to handle **18** and can provide torque to fasteners engaged by driver head **14** as handle **18** is rotated.

A magnetic screw starter **12** is disposed in the end of the handle **18** opposite the connection to shank **16**. Screw starter **12** is formed from a material having a high magnetic strength for securely holding selected fasteners. The screw starter **12** can be formed from a hard high carbon steel which can make a good, high strength permanent magnet, but which is too brittle and not acceptable for a general purpose screwdriver head. The magnetic screw starter **12** is disposed in an opening **20** formed in handle **18**. Screw starter **12** is securely connected to handle **18** to prevent relative movement of the starter **12** with respect to handle **18**.

The magnetic screw starter **12** comprises a permanent magnet body portion **21** having a mechanical driver **22** formed on its exposed end, to provide the required torque when handle **18** is rotated to start a screw **28**. The driver **22** formed on the magnetic starter **12** is constructed to handle the same size and type of fasteners as the associated primary driver head **14**. The primary driver head **14** is made to work with limited sizes of screws and the magnetic starter **12** is made to be used in cooperation with the primary screwdriver head **14** for starting the same size and type of screws or fasteners with which the primary driver head **14** can work.

The magnetic screw starter **12** can be recessed in handle **18**, as best shown in FIG. **2**. Handle **18** is preferably formed from a non metallic resin or plastic material. With the magnetic starter **12** recessed in opening **20**, the size and shape of opening **20** can determine the variety of fasteners which the magnetic screw starter **12** can accommodate. Opening **20** can have a counterbore **24**, formed at the outer open end, able to accommo-

date fasteners having a head shape different than the shape of the starter **12**. That is, the size and shape of the counter bore **24** can be used to determine what fasteners can be held by the magnet screw starter **12**. As shown in FIG. **2**, for certain size fasteners the counter bore **24** in contact with the screw head **26** can provide additional support. This is, the larger fasteners which can be accommodated by the recessed magnetic screw starter **12** will contact the sides of counter bore **24** and thus prevent the free end of fastener **28** from rotating or moving around the holding points of starter **12**. This helps assure that magnetic screw starter **12** will securely hold fastener **28**.

To further assure adequate holding power for the magnetic screw starter **12** the body portion **21** is constructed to have a relatively large cross-sectional area. The large cross-sectional area or diameter of body portion **21** of magnetic starter **12** provides a flat planar surface **27** that increases the pulling or holding force at a much improved rate over that which can be provided by an ordinary screwdriver having a magnetized driver head.

The height of driver **22** is made relatively small so that the fastener head **26** can directly contact the flat planar surface **27** of magnetic starter **12**. This provides a substantially greater holding force than can be achieved when the magnetic contact is made primarily between the driver **22** and the screw slot.

Since screw starters are generally required in tight work areas or where only one hand can be used it is very desirable that the screw to be started be held securely and not twist or wobble as the screwdriver is moved. The screw to be started should be securely held in a relatively fixed position with respect to the screwdriver handle **18** and should not shift as the orientation of the screwdriver is changed. Prior art magnetic screwdrivers have had problems in securely hold screws under various conditions. The disclosed screwdriver **10** has an integral screw starter **12** which can hold many types of screws securely. The screw head **26** in contact with counter bore **24**, and the top **27** of starter **12** in contact with screw head **26** provide for relatively rigid holding of screw **28** regardless of screwdriver **10** movement or orientation.

Having the magnetic starter **12** recessed in handle **18**, with no portion projecting beyond the end of handle **18** also serves to protect the starter **12** from physical damage due to screwdriver **10** mishandling. This allows a relatively brittle material, which has good magnetic properties but poor physical strength, to be used for forming magnetic starter **12**. Having the magnetic starter **12** recessed also assures that screwdriver **10** can accommodate and will be used only to start screws for which it is designed. As stated above, the counter bore **24** can also help to support properly sized screws.

The advantages of the disclosed screwdriver **10** are particularly evident when considered for use on screws or bolts which are meant to be non-removable. Non-removable screws have a head with only a partial slot formed therethrough. Half of each side wall which would define the slot are removed; thus, turning the screw, by inserting a driver in the partial slot and rotating, is possible in one direction only. That is, a non-removable screw can be inserted by rotating a driver inserted in the screw slot, but the screw cannot be removed since the portion of the slot against which the driver must act for backing out rotation is removed. These non-removable screws are particularly difficult for most screw starters to handle. Mechanical starters which require a complete slot with facing side walls cannot be used. An ordinary screwdriver with a magnetized driver head is not, in effect, securely holding non-removable screws since most of the magnetic holding force is concentrated in the partial slot. The disclosed magnetic screw starter **12** in which the screw head contacts a larger portion of the holding magnet can effectively hold screws with non-removable heads. The disclosed screw starter **12** provides a larger magnet in contact with the screw head **28** than is present in prior art magnetic screw holders. The counter bore **24** also helps support selected non-removable screws, and recessing the magnetic starter **12** in handle **18** allows a stronger but more fragile magnet to be utilized.

Referring now to FIGS. **3** through **6** there are shown various embodiments of the present invention. As in the embodiment shown in FIGS. **1** and **2**, the magnetic starter head of each screwdriver is constructed only to cooperate with and handle the same size and type of fastener as the primary driver head is designed to handle. FIG. **3** shows a screwdriver with a magnetic screw starter **42** constructed to handle Phillips head screws. FIG. **4** shows a screwdriver utilizing the teaching of this invention to be used for handling hex head fasteners. A magnetic screw starter **43** for hex head fasteners is provided. FIG. **5** shows a screwdriver with a magnetic screw starter **44** for holding socket head fasteners. FIG. **6** shows a screwdriver with a magnetic screw starter **46** constructed, for use with the clutch head fasteners. The operation and advantages of the screwdrivers shown in FIGS. **3** through **6** are similar to those described above for the embodiment shown in FIGS. **1** and **2**. The magnetic screw starters as shown in FIGS. **3** through **5**, are recessed in the handle **18** for mechanical protection, have a relatively large magnetic body portion for strong holding force, and the shape of the counter bore and magnetic driver head **42**, **43**, **44**, or **46** are formed to only accommodate the same size and type of fastener as the associated primary driver head.

Since numerous changes may be made in the above described apparatus different embodiments of the invention may be made without departing from the spirit and scope thereof, it is therefore intended that all the matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A screwdriver with integral, magnetic screw starter comprising:

an elongated handle;

a shank formed of a first material attached to and extending from one end of said elongated handle;

a first driver head formed at the free end of said shank;

an elongated magnetic screw starter, longitudinally aligned with said shank, formed of a second material having superior magnetizable properties and attached to the other end of said elongated handle opposite said shank; and,

a second driver head formed at the exposed end of said magnetic screw starter and being constructed for use in cooperation with said first driver by only accommodating the same size and type of screw as said first driver.

2. A screwdriver as claimed in claim **1**, wherein:

said elongated handle is formed from a non-metallic material and has an opening formed therein; and,

said magnetic screw starter comprises an elongated unitary body portion recessed and permanently secured in the opening formed in said elongated handle.

3. A screwdriver as claimed in claim **2**, wherein:

said second driver head is formed at the exposed end of said elongated body portion of said magnetic screw starter and is recessed and does not extend beyond the end of said elongated handle; and,

said second driver head extends from said magnetic screw starter a length less than the depth of the recess in the screw head of the screw to be started.

4. A screwdriver as claimed in claim **3**, wherein:

said elongated handle has an opening formed therein in which said magentic screw starter is recessed, of a size and shape to only accommodate the fasteners which said first driver head is designed to handle.

5. A screwdriver a claimed in claim **3**, wherein:

said elongated magnetic screw starter is cylindrical shaped with a diameter equal to the width of said second driver.

6. A screwdriver as claimed in claim **1**, wherein:

said magnetic screw starter comprises a unitary magnetic member;

said second driver extends from a flat planar surface formed at the exposed end of said magnetic screw starter; and

said second driver being of a small length so that the head of the screw to be started can contact the flat planar surface which is magnetized.

7. A screwdriver as claimed in claim **6**, wherein:

said magnetic screw starter comprises a unitary magnetic member which is recessed and permanently secured in said elongated handle;

a counter bore is formed around the exposed end of said magnetic screw starter to limit the size and type of screw head which can be accommodated by said magnetic screw starter to conform to the size and type of screw which said first driver is formed to handle;

said counter bore is constructed to contact the head of the screw to be retained when the screw to be started is held by said magnetic screw starter in contact with said flat planar surface of said magnetic screw starter; and,

said handle is formed from a nonmetallic material.

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