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SAFETY SWITCH DEVICE FOR POWER OPERATED TOOLS

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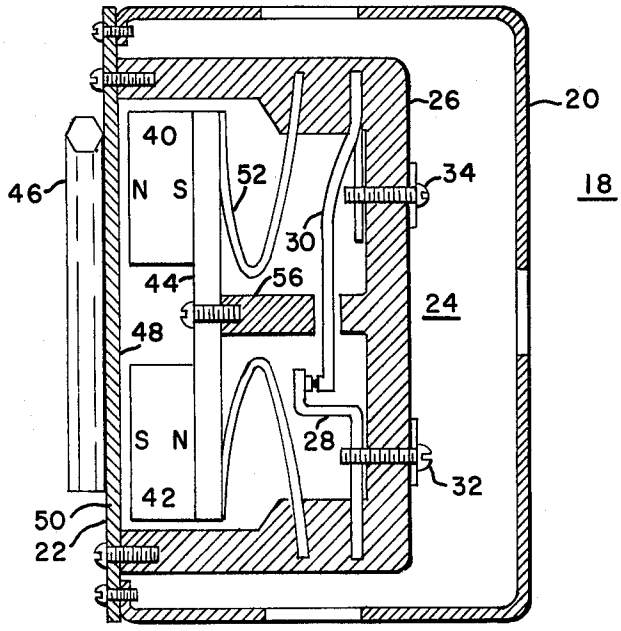


FIG. 2

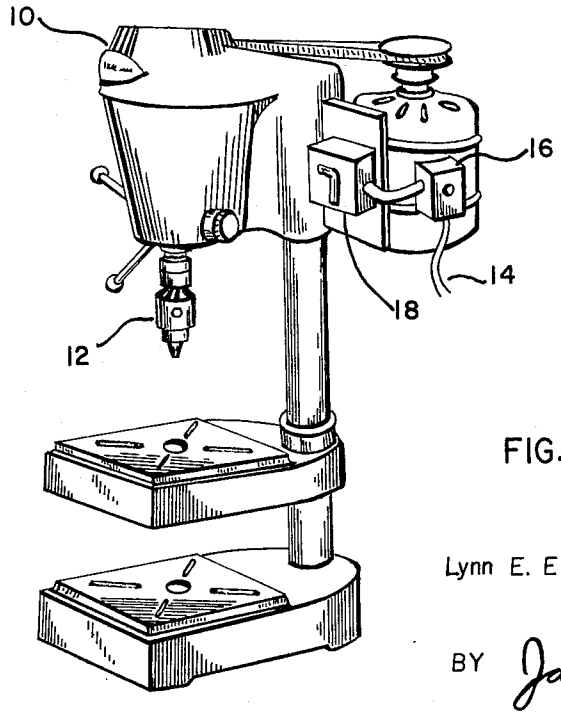


FIG. 1

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SAFETY SWITCH DEVICE FOR POWER OPERATED TOOLS

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This invention relates to safety devices for controlling electrically driven power tools. In particular the invention relates to the use of a magnetically actuated switch in the power circuit of such tools, whereby operation of the tool is prevented unless an adjusting key used in association with the power tool is placed against the face of the switch.

Many power driven machine tools, such as drill presses and lathes, have rotary chucks the jaws of which must be adjusted by means of a wrench or key which is generally fabricated of steel. It sometimes happens that the operator forgets to remove the key from the chuck after the chuck jaws have been set. Operation of the machine with the key remaining in the chuck creates a serious safety hazard since the key is frequently caused to rotate at high speed and thrown free of the chuck with considerable force. The prior art has provided switch means in the power circuits of machine tools whereby operation of the tool is prevented until the adjusting key has been placed in or upon the switch. Such safety devices have not proved to be entirely satisfactory, since they are easy to jam in the closed position by an operator who is unwilling to take the trouble to replace the key in the required position after adjustment of the machine is made.

It is a primary object of this invention to provide a safety switch for use in conjunction with machine tools which will prevent operation of the tool until the adjusting key has been placed against a face plate which forms a part of the switch. Another object of this invention is to provide a safety switch for machine tools which automatically secures an adjusting key in fixed position when the key is placed against a face plate which forms a part of the switch. Yet another object of this invention is to provide a safety switch which provides a readily accessible and convenient means for holding the key.

The invention is best described with reference to the drawings, of which:

FIG. 1 is a perspective view of a drill press equipped with a safety switch in accordance with this invention, and,

FIG. 2 is a side elevational view, partly in section, of switch means which may be employed in accordance with this invention.

Drill press **10** is provided with an adjustable chuck **12** which requires the use of an adjusting key which is separate from the drill press. Drill press **10** is provided with a power input circuit **14**, a manually operated on-off switch **16**, and a magnetic safety switch **18**. Referring to FIG. 2, a safety switch **18** is shown to comprise a housing or switch box **20**, and a smooth face plate **22** which is fabricated of a non-magnetic material such as aluminum, polyethylene, Bakelite or other non-magnetic metallic or non-metallic materials. Secured to plate **22** and disposed within box **20** is a magnetically actuated, normally open switch indicated generally by the numeral **24**. The switch **24** includes molded switch base **26** which is fabricated of an electrically insulating material. Fixed electrical contact **28** and movable electrical contact **30**, which may be made of beryllium-copper, are supported from switch base

26. Electrical connection to contacts **28** and **30** is conveniently made by means of screws **32** and **34** respectively. Two magnets, **40** and **42**, are supported by means of a ferrous metal support plate **44**. Magnets **40** and **42** are arranged with opposite polarity as shown, so that the placing of a ferrous object such as chuck adjusting key **46** in proximity to face plate **22** will form a closed series magnetic circuit comprised of magnets **40** and **42** together with support plate **44** and key **46**. By this specific design, maximum attraction between the magnets and key **46** is obtained, whereby magnets **40** and **42** together with supporting plate **44** advance towards the inner surface **48** of face plate **22**. The magnets also operate to secure key **46** tightly against the external surface **50** of face plate **22**.

Support plate **44** is movably supported from switch base **26** by means of a pair of rebent spring elements **52** and **54**. A plunger **56**, which is fabricated of an electrically insulating material, is secured to support plate **44** and shaped to actuate movable contact **30** to separate contacts **28** and **30** when magnets **40** and **42** are in a position more remote from the surface plate **22**. It will be understood that resilient contact **30** is adopted to make connection with contact **28** when no external force is applied to it. Rebent spring elements **52** and **54** are of higher spring constant than resilient contact **30** and adopted to force contact **30** to the open position when no magnetic material is positioned within the field of magnets **40** and **42**. Thus the contacts are normally in the open position. When a magnetic object, such as steel key **46**, is placed in proximity to the external surface **50** of face plate **22**, magnets **40** and **42** act upon the magnetical object and advance towards the inner surface **48** of face plate **22** against the resiliency of springs **52** and **54**. The magnets eventually come to rest against surface **48** of the face plate, and contact **30** moves under the influence of its natural resiliency to make connection with contact **28**. The magnets also hold the key **46** tightly against the external surface **50** of the surface plate to retain it in fixed position.

While the invention has been described with reference to a preferred embodiment illustrated in the drawing, it will be evident to those skilled in the art that numerous other switch structures may be employed which will serve the dual functions of closing the power circuit to the machine tool when the key is placed adjacent to the switch face plate, and retain the key in this position by magnetic attraction. For example, the magnetic switch may employ a single movably supported magnet, together with a pair of contacts, and means for opening or closing the contacts in response to movement of the magnet. Optionally, the key may provide the magnet and the switch merely include a magnetically attractable mass which is movably supported and attached to actuate normally open contacts to move them to the closed position.

What is claimed is:

1. In combination with an electrically powered tool having an adjustable driven element and a key fabricated of a ferrous metal for adjusting said driven element, the improvement comprising switch means for controlling electric power input to said tool including a box having a face plate fabricated of a non-magnetic material, said face plate providing an exposed surface externally of said box, a support member fabricated of a ferrous metal disposed within said box, first and second magnets supported by said support member with the north pole of said first magnet and the south pole of said second magnet adjacent

said support member, spring means for supporting said support member and magnets for movement from a position nearer said face plate to a position more remote from said face plate and yieldably forcing said support member and magnets to the position more remote from said face plate, a pair of electrical contacts responsive to movement of said support member whereby said contacts are closed when said support member is in said nearer position, but not otherwise, whereby when said key is placed against said exposed surface of said face plate said magnets and support member advance toward said face plate, said contacts close, and said magnets, support member, and key together form a single closed series magnetic circuit to hold said key securely against said face plate.

2. An apparatus in accordance with claim **1** in which one of said contacts is rigid and the other is movably supported and yieldably urged to the closed position, and including an electrically insulating projection operably supported by said support member and shaped to connect with and move said movable contact to the open position when said magnets move to the position more remote from said face plate.

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