ABSTRACT: A magnetic retrieving tool which comprises an elongated handle, an elongated magnetic member and a hinge means. The hinge means secures the magnetic member to the handle and has means to maintain the magnetic member at a fixed angle with respect to the handle. The hinge means enables the magnetic member to be moved with respect to the handle without any adjustments made to the hinge means.
MAGNETIC RETREIVING TOOL

This invention relates generally to magnetic retrieving tools and more particularly to a magnetic retrieving tool having hinge means which enable quick adjustment of the magnetic portion of the retrieving tool with respect to the handle without requiring butterfly nuts and other tightening means for maintaining the angle with respect to each other. Magnetic retrieving tools are utilized to remove magnetic particles from difficult to reach places. That is, in such inaccessible places as a crank case in an automobile, abrasive metal particles are often required to be removed. Elongated magnetic retrieving tools are specifically made for these purposes. However, conventional magnetic retrieving tools require constant adjustment of the disposition of the magnetic head with respect to the handle. That is, both the head of the tool and the handle are elongated and must be movable with respect to each other so that the magnetic tool can pass through curved paths. Consequently, the head of the retrieving tool and the handle must be bent with respect to each other at different angles for different types of retrieving operations. A typical hinge between the magnetic head and the handle normally comprises a joint means for receipt of a butterfly nut assembly which enables the head of the tool to pivot with respect to the handle about the axis of the head. When the angular disposition between the handle and the head are changed, the butterfly nut must be unloosened, and when the correct angle is obtained, the nut must be tightened. Consequently, the adjustment between the handle and the head must be made after each use thereof. Also, because the handle and the head pivot about an axis through the butterfly nut it is difficult to place the conventional magnetic retrieving tool around corners. It is therefore an object of the invention to overcome the aforementioned disadvantages.

Another object of the invention is to provide a new and improved magnetic retrieving tool which is inexpensive to manufacture yet simple to use. Still another object of the invention is to provide a new and improved hinge for a magnetic retrieving tool which enables the head to be rotated with respect to the handle without requiring a loosening and then tightening operation after each use of the magnetic retrieving tool. Still another object of the invention is to provide a new and improved hinge for maintaining a fixed angular disposition between two elongated members which utilizes spring tension to maintain the angular disposition.

These and other objects of the invention are achieved by providing a magnetic retrieving tool which comprises an elongated handle, an elongated magnetic member and a hinge member for securing the magnetic member to the handle. The hinge means has means to maintain the magnetic member at a fixed angle with respect to the handle. The hinge means enables the magnetic member to be moved with respect to the handle without any adjustments.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of a magnetic retrieving tool embodying the invention;

Fig. 2 is an exploded enlarged perspective view of the hinge of the retrieving tool; and

Fig. 3 is an enlarged sectional view taken along the line 3-3 in Fig. 1.

Referring now in greater detail to the various figures of the drawing wherein similar reference characters refer to similar parts, a magnetic retrieving tool embodying the invention is shown generally at 20 in Fig. 1.

The magnetic retrieving tool 20 basically comprises an elongated handle 22, a magnetic head 24 and a hinge 26 for pivotally securing the magnetic head with respect to the handle. The handle 22 is cylindrical and elongated and includes a knurled surface 28 at one end of the handle to facilitate a tight grip about the retrieving tool.

The head 24 is elongated and is preferably comprised of a permanent magnet. The head 24 is generally cylindrical and, as best seen in Fig. 2, includes a flattened end piece 30 which are rounded at end surface 32. Similarly, the cylindrical handle 22 includes a flattened end piece 34 which is also rounded at end surface 36. End pieces 30 and 34 each include a circular opening 38.

The hinge 26 is best seen in Fig. 2 and includes, in addition to the flat end pieces 30 and 34, a pair of arcuate spring members 40. The outer surfaces 42 of the spring members 40 are convexly arcuate and the inside surfaces 44 of the spring members 40 are concavely arcuate. Each of the spring members 40 includes an opening 46 at the center thereof. The hinge members 40 each include a pair of projections 48 which laterally project from the inner surfaces of the end of the spring members. Depressions 50 at the ends of the spring members 40 and on the outer surface thereof are produced in forming the projections 48.

The hinge 26 also includes a fastening member 52 which preferably comprises a rivet. The shank of the rivet 52 is elongated and is telescoped through the openings 46 in the spring members 40. As best seen in Fig. 3, when the hinge 26 is assembled, the projections 48 of each of the spring members project into the openings 38 of the flattened end pieces 30 and 34.

The rivet 52 which is flattened at end 54 secures the spring members 40 against the surfaces of the flattened end portions 30 and 34. Thus, as best seen in Fig. 3, the insertion of rivet 52 causes both of the spring members 40 to be flattened out and the inner surfaces of the spring members 40 to engage the outer surfaces of the flattened end portions 30 and 34 of the head and handle, respectively.

Since the inner surfaces of the spring members 40 are normally concave, there is a resultant frictional engagement between the ends of the spring members and the outer surfaces of the end pieces 30 and 34. Consequently, the spring members 40 act to engage the flattened portions to maintain the elongated head at a fixed angular rotation to the handle 22.

Because the frictional engagement is spring urged between the spring members and the flattened portions, the frictional engagement can be overcome by manual forces to rotate the head 24 with respect to the handle 22. It should be noted that handle 24 rotates about an axis through projections 48 through openings 38 in end portion 30. Similarly, the handle 22 rotates about an axis through the projections 48 through openings 38 of flattened portion 34. Therefore, in order to rotate the handle with respect to the head member, it is necessary only to overcome the frictional engagement between the spring members and the flattened portion. After the rotational force has been removed, the handle and the head are maintained in the fixed angular position with respect to each other because of the spring urged frictional engagement by the hinge 26.

It should be noted that the axes of rotation through projections 48 are spaced from each other. This spacing enables the head 24 to be rotated with respect to the handle 22 at a sharp angle without causing a sharp angle at the apex between the handle and the head. Thus, at the hinge 26 the handle and the head are spaced from each other substantially the length of the spring members 40 of the hinge 26.

The double axis enables the magnetic head 24 to be inserted and pass about angles in pipes and through winding openings. Also, the retrieving tool can be used to reach around walls because the handle and handle are pivoted with respect to each other about each of the axes through projections 48.

It can therefore be seen that a new and improved magnetic retrieving tool has been provided. The magnetic retrieving tool requires no frictional adjustments after each use of the magnetic retrieving tool. The hinge enables the head to be maintained in a fixed position with respect to the handle un-
less a manual force is used to overcome the frictional engagement of the hinge to change this fixed disposition of the portions with respect to each other.

Without further elaboration, the foregoing will so fully illustrate my invention that others may, by applying current or future knowledge, readily adapt the same for use under various conditions of service.

What I claim as the invention is:

1. A magnetic retrieving tool comprising an elongated handle, an elongated magnetic member and a hinge means for securing said magnetic member to said handle, said hinge means comprising a pair of spring members arcuately shaped along their longitudinal axis and flat along a transverse axis, said ends of said elongated members being flattened with said spring members being provided, one on each side, an aligned ends of said elongated handle and member and being secured together to flatten the spring member so as to resiliently engage the ends of said elongated members.

2. The invention of claim 1 wherein said spring members each include a pair of projections on their surface facing the flattened portions and said flattened portions each have an opening, said projections extending into said openings so that said magnetic member and said handle pivot with respect to each other about the axes through said projections.