Aug. 9, 1949. W. F. MUNDT 2,478,775

SPOOL

Filed June 23, 1945

Fig. 1

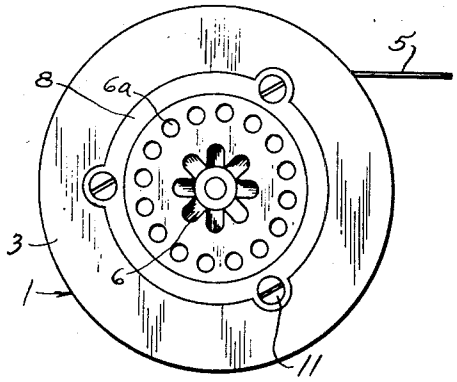


Fig. 2

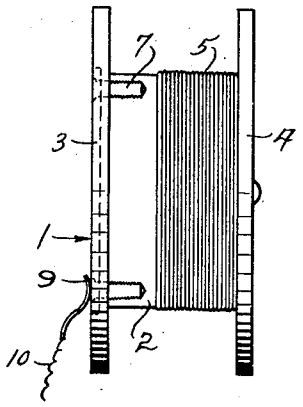


Fig. 3

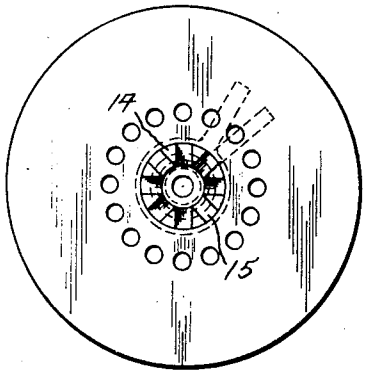
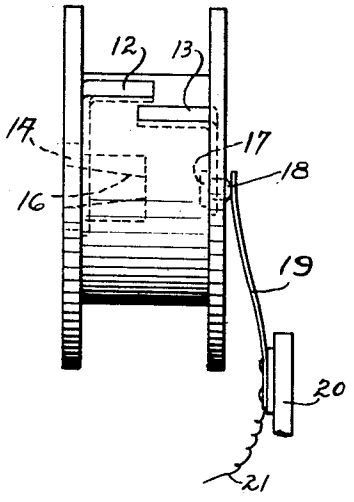


Fig. 4



Inventor
Walter F. Mundt

by The Firm of Charles H. Hills Attys

Patented Aug. 9, 1949

2,478,775

UNITED STATES PATENT OFFICE

2,478,775

SPOOL

Walter F. Mundt, Chicago, Ill., assignor to Armour Research Foundation of Illinois Institute of Technology, a corporation of Illinois

Application June 23, 1945, Serial No. 601,208

5 Claims. (Cl. 242—118)

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The present invention relates generally to a magnetic recording and reproducing device, and more particularly to a spool construction embodying an electrical switch useful for controlling an electric circuit in such device.

In the operation of a magnetic wire sound recorder, a longitudinally moving recording medium, such as a paramagnetic wire, is moved along a groove disposed centrally of confronting poles of an electromagnetic head at right angles to the pole faces, and incremental portions of the wire are variably magnetized in a longitudinal direction in accordance with variations in current impressed on the elecromagnet coil by sound waves falling on a microphone. After the recording is completed, the wire is rewound onto the spool from which it was originally unwound, and afterwards, it is again moved in the same direction through the electromagnetic recorder head, but this time the head serves as a pick-up unit for the purpose of reproducing the record through an amplifier onto a loud speaker, earphones, or similar reproducing device.

It is generally desirable to provide an automatic circuit for effecting the rewinding operation when almost all of the wire has been unwound from the spool. Various devices have been used in the past for effecting this purpose, but these have generally had the objection of being somewhat complicated and at times unreliable.

An object of the present invention is to provide a simple and reliable means for effecting electrical switching upon unwinding of most of the wire from a spool such as used in a magnetic recorder.

A more specific object of the present invention is to provide a novel spool embodying an electrical contact member cooperable with the wire being wound or unwound, and which is so disposed as to effect opening of an electrical circuit upon unwinding of substantially the entire length of wire from the spool.

Other objects and advantages will become apparent from the following description of certain embodiments of the present invention taken with the accompanying drawing wherein:

Figure 1 is a front view of a novel spool for use in a magnetic recorder and reproducer, and embodying an electric switch in accordance with the principles of the present invention;

Figure 2 is a side view of the structure shown in Figure 1;

Figure 3 is a front view of a modified form of spool and switch construction somewhat different from that shown in Figures 1 and 2; and

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Figure 4 is a side view of the structure shown in Figure 3.

Referring more particularly to Figures 1 and 2, numeral 1 denotes a spool, preferably made of insulating material such as, for example, mica or a moldable plastic material. Spool 1 generally comprises a hub portion 2 flanked by two disk portions 3 and 4. A wire 5, such as, for example, one made of paramagnetic material such as steel, if the spool is used in a magnetic recorder or reproducer, is unwound from spool 1 onto another spool (not shown), or is wound onto spool 1 from such other spool during the recording (or reproducing) and rewinding operations, respectively. A sprocket-like well 6 is provided on the face of disk portion 3 for accommodating a driving member (not shown) having correspondingly shaped teeth for forming a mechanical coupling therewith so that the two may be rotated simultaneously.

A plurality of circumferentially disposed holes 6a are provided to co-act with a stationary brake or clutch member (not shown) for holding the spool from rotation when it is not being driven. A plurality of contact members 7 are disposed longitudinally of the surface of hub portion 2, and serve as contact fingers for engaging wire 5 as it is wrapped therearound to complete an electrical circuit extending through the wire. Contact members 7 are embedded in the hub portion 2 with their surfaces flush with the surface of hub portion 2. A slip ring 8 is connected to one of the ends of the respective contact members 7, and a stationary brush 9 is slidable with respect to the slip ring 8. Terminal wire 10 is connected to the brush 9 for introducing current to the contact members 7. A plurality of screws 11 are provided for fastening the slip ring 8 to the surface of disk 3.

A convenient way of constructing contact members 7 is to form them from threaded portions of the studs or screws 11 which hold the slip ring 8 onto the surface of disk 3 by filing off portions of the stems or studs of the screws that otherwise would protrude above the surface of hub 2.

In operation, wire 5 is connected to an electrical circuit by brushes or other devices (not shown) so that when wire 5 is wound onto the hub portion 2 of the spool, it will cover and contact the surface portions of the contact members 7, thus completing an electrical circuit from wire 5 through contact members 7, slip ring 8, brush 9 to conductor 10.

Figures 3 and 4 show a modified form of spool

embodying a pair of contact members 12 and 13 which are somewhat L-shaped; that is, having radially extending arms terminating in axially extending contact finger portions. Contact member 12 is connected to a cylindrical metallic sleeve portion 14, such as by welding, which sleeve portion has circumferentially disposed teeth 15 for engaging a correspondingly toothed driving member, and a tapered groove 16 for accommodating the shaft of the driving member to center the spool. The radial arm of contact member 13 is secured by a bolt and nut or other fastening means 17 to a contact terminal 18 which is engageable by spring 19, insulatingly mounted on a fixed support 20, so as to continually provide a yieldable friction contact pressure so as to axially support the other end of the spool. A terminal wire 21 is connected to contact 18 for introducing current.

The electrical circuit extends from wire 21 through contact member 13, through the bridged gap between such contact member and contact member 12 provided by wire 5 when wrapped in contact therewith, to the sleeve portion 14 and the drive shaft associated with groove 16. The shaft is normally grounded to complete the circuit. An advantage of this construction over that shown in Figures 1 and 2 is that only a small portion of wire 5 has the electric control current passing therethrough; namely, that portion bridging the gap between contact members 12 and 13, therefore introducing a minimum amount of distortion in the recording or reproducing system.

Thus it will be seen that I have provided an efficient spool member embodying an electrical switch so as to make it adaptable for use in an automatic rewinding mechanism such as used in a magnetic recording device. It should be noted, however, that the device is also of general application, and may be used in connection with other circuits than magnetic recording circuits where it is desired to open or close a circuit upon completion of the unwinding operation of a wire from a spool.

Modifications will be readily suggested to those skilled in the art after having had the benefit of the teachings of the present invention. For example, instead of making the spool of insulating material, it may be made of metal, and the contact member as well as the wire, suitably insulated from the spool.

While I have shown particular embodiments of my invention, it will, of course, be understood that I do not wish to be limited thereto, since many modifications may be made, and I, therefore, contemplate by the appended claims to cover all such modifications as fall within the true spirit and scope of my invention.

I claim as my invention:

1. A spool of insulating material adapted to have a metallic wire wound therearound, and including a hub, a contact member having a sleeve portion extending axially of said hub, having a portion extending radially from said sleeve portion and having a portion serving as a contact finger located at the surface of said hub and

adapted to contact a plurality of turns of said wire wound on the hub surface.

2. A spool of insulating material adapted to have a metallic wire wound therearound and including a hub portion flanked by two disc portions, a pair of metallic contact members each having an arm radially extending from the central portion of the hub portion, said arms having axially extending outer fingers flush with surface portions of said hub portion so as to contact a few turns of said wire wrapped around the hub portion, said wire being adapted when wound on said hub portion to bridge said axially extending outer fingers of said contact members.

3. A spool of insulating material adapted to have a metallic wire wound therearound including a hub, a contact member having an arm portion extending radially of said hub and a contact finger portion extending along a longitudinal surface portion of said hub and adapted to contact a plurality of turns of said wire wound on said hub surface portions, said contact member having a sleeve portion extending axially of said hub and adapted to form a sliding electrical contact with a driving shaft for said hub.

4. A spool of insulating material adapted to have a metallic wire wound therearound including a hub portion flanked by two disc portions, a pair of metallic contact members each having a radially extending arm embedded in the hub portion, said arms having longitudinally extending outer ends flush with a longitudinally extending surface portion of said hub portion so as to contact a few turns of said wire wrapped around the hub portion, said wire adapted for forming a bridging contact with said longitudinally extending outer ends, said contact members each having an integral sleeve portion extending axially of said hub portion, one of said sleeve portions having teeth disposed therein for accommodating a toothed driving shaft.

5. In a magnetic recorder, means for winding a paramagnetic wire comprising a spool, a pair of contact members insulatingly embedded in the hub portion on opposite sides of said spool and having their outer ends disposed flush with surface portions of said hub portion so as to be bridged by a plurality of turns of said wire, a sleeve portion axially of said hub portion and connected to one of said contact members, and adapted to be engaged by and driven by a driving shaft.

WALTER F. MUNDT.

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