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PROTECTIVE DEVICE FOR TUBE MILLS

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FIG. 1.

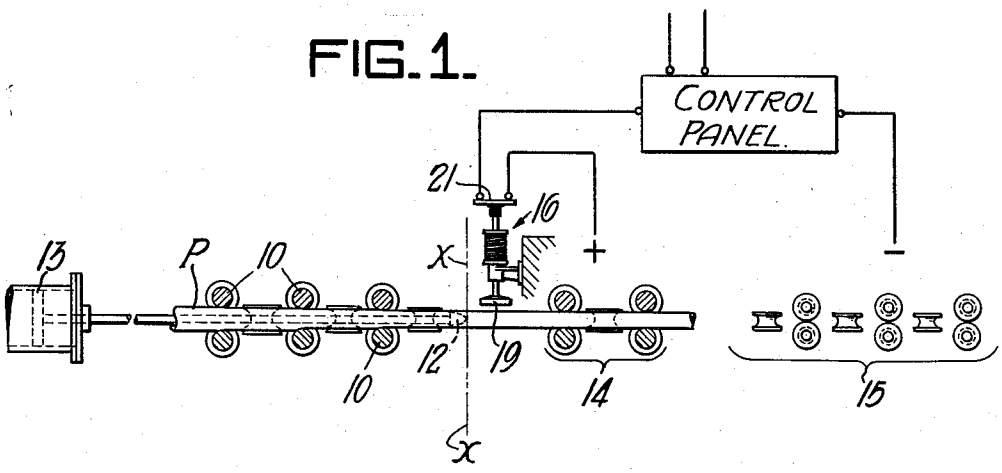
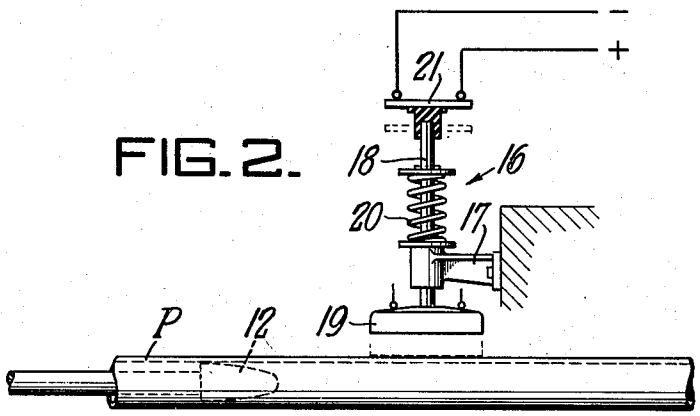


FIG. 2.



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PROTECTIVE DEVICE FOR TUBE MILLS

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2 Claims. (Cl. 80—43)

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This invention relates to protective devices for automatically stopping tube mills in the event a workpiece contains a foreign body which might damage the mill.

An object of the present invention is to provide improved protective devices which include magnetic detection means actuated by any magnetic foreign body within a heated tubular workpiece for automatically opening an electric circuit which stops the mill.

A further object of the invention is to provide improved protective devices which include a movable magnet attracted by any cold iron or steel foreign body in a heated tubular workpiece, but not by the workpiece itself and by its movement when thus attracted opens an electric circuit for stopping a mill.

In accomplishing these and other objects of the invention, we have provided improved details of structure, a preferred form of which is shown in the accompanying drawing, in which:

Figure 1 is a schematic view of a portion of a seamless tubing mill equipped with a protective device embodying features of the present invention; and

Figure 2 is a schematic view on a larger scale of the protective device.

The protective device of the present invention is illustrated in connection with a hold-back mandrel mill of a seamless tubing mill where there is a possibility of a mandrel's breaking loose and traveling with a tubular workpiece into the sizing mill. The sizing mill is constructed to reduce the diameter of a heated tubular workpiece, but not to reduce the wall thickness. Consequently the mill cannot accommodate closely fitting internal bodies, and any foreign body, such as a mandrel, within the bore can severely damage the sizing mill. However, this particular environmental structure is illustrative only and in no sense limiting. The protective device has general application wherever there is a possibility of a cold iron or steel foreign body getting within a hot tubular workpiece and causing mill damage.

Figure 1 shows a mandrel mill, which is of the hold-back type and comprises a plurality of stands 10, a mandrel 12 and a hold-back cylinder 13. A tubular workpiece P heated to a high temperature enters the mill from one side and travels from left to right in the mill. The mandrel travels with the workpiece as it moves through the stands 10, but the line X—X indicates the normal limit of forward travel of the mandrel. When the mandrel tip reaches this

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line, the workpiece commences to be stripped from the mandrel and the hold-back cylinder retracts the latter. Next the workpiece travels to a multi-stand sizing mill 14 and a multi-stand reducing mill 15. The equipment thus far described can be of any standard or desired construction, and therefore is not shown in detail.

A protective device 16 embodying features of the present invention is situated between the normal limit of forward travel of the mandrel (line X—X) and the first stand of the sizing mill. The protective device comprises a mounting bracket 17, a spindle 18 movably supported in said bracket, a magnet 19 on the end of said spindle adjacent the path of the workpiece through the mill, and a spring 20 surrounding said spindle and urging the magnet away from said path. The magnet can be either a permanent magnet or an electromagnet. The opposite end of the spindle operates a circuit breaker 21, shown only diagrammatically. The circuit breaker is electrically connected with the mill operating circuit, so that when the breaker is opened, the mill stops.

The workpiece P is at a temperature in excess of 1300° F. At this temperature it is substantially non-magnetic so that it can pass the magnet 19 without moving the latter. However if a broken mandrel or other foreign body of relatively cold iron or steel passes the protective device, this body attracts the magnet against the action of spring 20. The resulting movement of spindle 18 operates the circuit breaker 21 and thus opens the circuit to the mill and stops the mill before the foreign body reaches it and causes damage.

From the foregoing description it is seen that the present invention affords a simple and effective device for protecting tube mill equipment against foreign bodies within the tubes. Such bodies are quickly detected and the mill automatically stops before they can cause damage.

While we have shown and described only certain preferred embodiments of the invention, it is apparent that modifications may arise. Therefore we do not wish to be limited to the disclosure set forth but only by the scope of the appended claims.

We claim:

1. In a tube rolling mill adapted to perform work on nonmagnetic hot tubular workpieces and having an electric operating circuit, the combination with said mill of a protective device comprising a magnet movably mounted in

advance of the entry side of said mill adjacent but spaced from the path of workpieces through the mill and being insensitive to the workpieces, said magnet being adapted to move into engagement with the outside of a workpiece by attraction from magnetic foreign bodies within the bore of a workpiece, and a circuit breaker operatively connected with said magnet for stopping the mill whenever said magnet thus moves.

2. In a tube rolling mill adapted to perform work on nonmagnetic hot tubular workpieces and having an electric operating circuit, the combination with said mill of a protective device comprising mounting means situated in advance of the entry side of the mill, a spindle slidably carried by said mounting means, a magnet carried by said spindle at one end thereof adjacent but spaced from the path of workpieces through the mill and being insensitive to the workpieces, a spring urging said magnet away from this path, and a circuit breaker operatively connected with said spindle, said spindle and

magnet being adapted to move toward the path of workpieces to a position where the magnet engages the outside of a workpiece under the attraction of magnetic foreign bodies within a workpiece and to operate said circuit breaker to stop the mill when such a foreign body passes within the influence of said magnet.

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