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MANDREL-PROTECTING DEVICE FOR COLD-PILGER ROLLING MILLS

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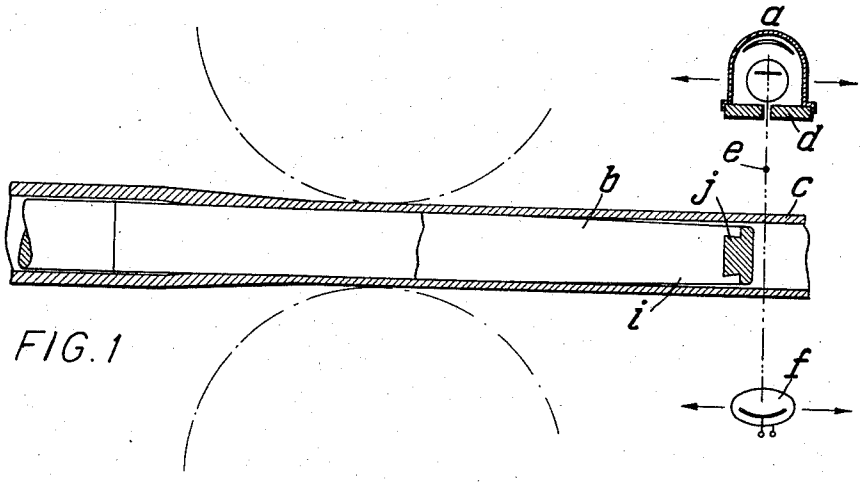


FIG. 1

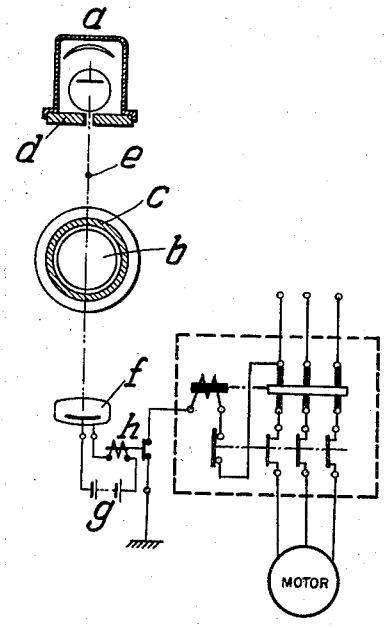


FIG. 2

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MANDREL-PROTECTING DEVICE FOR COLD-PILGER ROLLING MILLS

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1 Claim. (Cl. 80—11)

The invention concerns a mandrel-protecting device for cold-pilger tube rolling mills. By far the largest part of the breakdowns which occur in the operation of cold-pilger rolling mills is caused by the breaking of the mandrel over which the tube is being drawn. These breakages of the mandrels occur in the part of the cone of the mandrel most subjected to stress. The front end of the mandrel freed when the mandrel rod is thus broken is freely pulled between the barrels of the rolls of the machine which keeps on running. This forcibly pushes the rolls apart resulting in considerable danger to the entire roll stand.

Mandrel-protecting devices have been known. In one device a thin feeler rod is held at the front end of the mandrel ahead of it at a predetermined distance, about 5 cm. This rod leads through the issuing finished tube. It operates a terminal switch located at the end of the discharge channel, if the end of the mandrel breaks and migrates more than a certain distance in the direction of the discharge side. Actuation of the end switch causes disconnection of the main motor. In another device a hydraulic roll-safety device is provided which, in the case of an excess roll pressure produced by pulling in the broken end of the mandrel between the rolls makes possible a turning aside of the rolls. This is done by the hydraulic cylinders located on the roll stand and, by means of suitable valves, adjusted to a definite rolling pressure, in the case of excessive pressure, blow off, thereby making possible turning aside of the rolls. These known devices have the drawback that, in the former, by the required pulling off of the finished tubes over the safety rod, makes the operation of producing tubes difficult and in the case of high-speed cold-pilger machines, another operator is required. The second mentioned prior art arrangement operates with a certain inertia, which, under certain circumstances, does not fully eliminate the moments of danger.

In the mandrel safety device according to the application, the preceding drawbacks are avoided by displaceably providing shortly beyond the end of the mandrel outside the tube to be pilger-treated—preferably in the longitudinal free end thereof—a radiation sender and a radiation receiver. The latter is connected with a relay located in a circuit which influences the main motor switch and by equipping the end of the mandrel with a part not permeable to the rays used.

The arrangement of the parts and their mode of operation will be seen in detail in the drawings. In the drawings—

Figure 1 is a longitudinal diagrammatic view of the mandrel end, rolls and tube and their dimensional relations to the mandrel protecting device of our invention.

Fig. 2 is a view partly in vertical cross-section revolved 90° from the radiation line *e—f* of Fig. 1 of the mandrel protecting device and showing the electric circuitry in diagram.

By means of a suitable radiation generator *a* located directly, i.e., a few millimeters prior to the discharge end of the rolling mandrel *b* when in normal operating position, a radiation (e.g., X-rays) suitable to pass through the material *c* to be rolled, is sent across the material. The radiation is in the form of a radiant beam *e* by means of a light-stop *d* in the generator *a*. This is made of suitable material such as lead. After passing through the rolled tube *c*, this beam of radiant energy *e* strikes a suitable receiver *f* inserted in an electrical circuit *g* containing a battery. In normal operation, this circuit is closed and a relay *h* therein is closed. The front end of the mandrel *i*, while not involved directly in the drawing process proper is impermeable to the radiant energy *e* coming from the source of radiation *a* and which passes through the rolling material. This is achieved by attaching a lead head *j* to the end *i* of the mandrel *b*. The circuit also contains a relay *h* adapted to influence the main motor circuit (not shown) through suitable connections.

Now, if, upon breaking of the mandrel, the mandrel end *i* moves in the direction of movement of the material *c* being rolled, the beam of rays *e* is interrupted by the lead head *j* and thereby the circuit *g* loses its electrical potential. The relay *h* then opens up, thereby operating through suitable connecting means the disconnection of the main driving motor of the cold-pilger rolling mill.

By the arrangement according to the present application, starting the disconnecting process in case of mandrel breakage takes place practically without inertia.

For adapting the mandrel-protecting device to all operational requirements, the apparatus is so attached to the rolling mill that it is movable in the direction of rolling (as indicated by the arrows in Figure 1) and is exactly adjustable to any desired position.

What is claimed is:

A mandrel-protecting device for a cold-pilger tube rolling mill, comprising a mandrel, a radiant energy generator and a radiant energy detector therefor adjustably mounted outside and on opposite sides of the tube being treated, closely beyond the end of the mandrel in the longitudinal direction, in combination with an electric circuit in which the detector is located, a relay activated by that circuit, a main motor switch influenced by that relay, and an end portion on the mandrel impermeable to the radiant energy; whereby if the mandrel breaks the impermeable end will be drawn into the path of the rays and the relay will influence the main switch and stop the mill.

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