

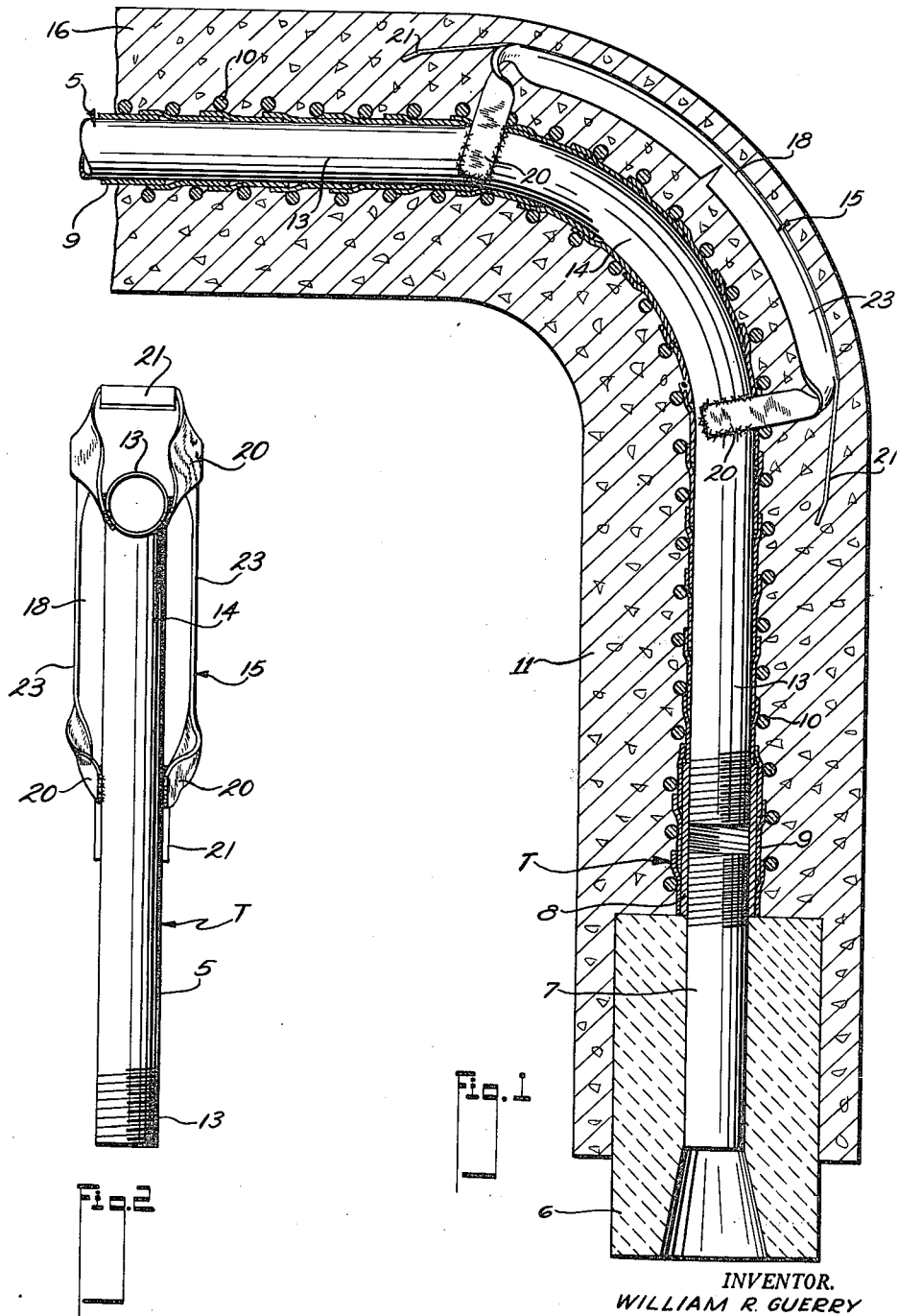
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PROTECTOR SKID FOR THERMOCOUPLES

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PROTECTOR SKID FOR THERMOCOUPLES

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The present invention relates generally to the thermocouple art and is more particularly concerned with a novel combination of a thermocouple head and means associated therewith for supporting and protecting the head and its customary refractory casing.

For determining the temperature of molten steel in an open hearth furnace, for example, an immersion type thermocouple is customarily used. This device comprises the usual parts, including the couple and wires for connecting the couple electrically to a potentiometer, and a head enclosing and protecting the wires from direct contact with the molten metal and comprising a pipe and a graphite sleeve connected to one end of the pipe to enclose portions of the wires adjacent to the couple and refractory material surrounding the pipe. To facilitate movement of the device through the furnace doorway, the pipe is bent adjacent to its hot end at substantially right angles. Because of this shape of the pipe, the refractory material on the outside of the pipe bend quite frequently comes forcibly into contact with the door frame or floor and thus is damaged so that its normal life has always been very short. Previous attempts to increase the length of life of these devices have not been entirely satisfactory, so far as I know.

My invention not only substantially increases the length of life of thermocouple heads several times as many readings being obtainable herewith as with prior devices, but also makes it possible repeatedly to patch or replace the refractory material which is broken away in normal use, particularly at the bend where the need for such repair is greatest.

Further objects and advantages of the present invention will be pointed out hereinafter as the description of a typical device of this invention proceeds, reference being had to the drawings accompanying and forming a part of this specification, in which:

Fig. 1 is a fragmentary cross sectional view of a device embodying this invention in a preferred form; and

Fig. 2 is an end elevational view of the pipe and head support parts of Fig. 1, other parts having been removed.

The form of the invention illustrated herein comprises a thermocouple head T which includes a pipe 5, a graphite sleeve 6 connected to the hot end of the pipe by means of a tube 7 cemented in the sleeve and having a threaded end extending therefrom and a coupling 8 screwed on to said end and on to the adjacent threaded end of pipe 5.

Pipe 5 is bent adjacent to the coupling so that portions 13 on either side of this bend or arcuate section 14 extend at substantially right angles to each other. A skid 15 of sheet metal is attached to pipe 5 near each end of the bent section 14. This skid has a body portion 18 bent on an arc corresponding to that of section 14 and has end edge portions bent downwardly and turned inwardly, as viewed in Fig. 1, to constitute four legs 20 arranged in two pairs. Central extremities 21 of the skid are bent at a small angle to adjacent straight portions 13 of the pipe. The free ends of legs 20 are welded to the sides of the pipe and straddle the pipe at approximately the junctions of straight portions 13 and the arcuate portion 14 with the curved part on body 18 lying outside of the bend of section 14.

The outer edge portions, constituting approximately two-thirds of the width to the skid, are turned downwardly as flanges 23 and define a channel extending therebetween. These flanges are slotted in approximately their mid-sections to facilitate the bending of the body. Legs 20 being of approximately the same length, in effect, serve to maintain the body of the skid at a substantially uniform, predetermined, desired distance from the adjacent portions of pipe 5 throughout the length of curved section 14.

The pipe 5 and coupling 8 are wrapped with asbestos tape 9 which is held in place by wire 10 and these parts as well as skid 15 are encased in a body or casing of refractory material 11.

It will be understood that the skid 15 serves several purposes. It reinforces and retains the refractory material at the place which receives most of the impact blows in use, and it protects the bent part of pipe 5 against damage due to such impacts. It affords a good anchor for patches of refractory material which may be applied to replace similar material which has been broken away in use. By reasons of these several advantages which are possessed by devices embodying this invention, the useful life of such devices may be several times as great as that of other thermocouple devices used heretofore.

Having thus described the present invention so that others skilled in the art may understand the same, I state that what I desire to obtain by Letters Patent is set out in what is claimed.

What is claimed is:

1. A thermocouple head comprising a pipe having a bent portion between its ends and a refractory material reinforcing and retaining means attached to said pipe and comprising a sheet metal body, said body having an elongated relatively narrow portion bent to con-

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form generally to the bent portion of the pipe and spaced on one side and outwardly of said pipe portion.

2. A thermocouple head comprising a pipe having a bent portion between its ends and a refractory material reinforcing and retaining skid comprising a sheet metal body, said body having an elongated relatively narrow portion bent to conform generally to the bent portion of the pipe and spaced on one side and outwardly of said pipe portion, and having pairs of legs at its ends secured to the pipe near each end of said bent portion.

3. A thermocouple head comprising a pipe having a bent portion between its ends and a refractory material reinforcing and retaining skid attached to said pipe and comprising a sheet metal body, said body having an elongated relatively narrow portion bent to conform generally to the bent portion of the pipe and spaced on one side and outwardly of said pipe portion and having side edge portions bent inwardly into approximate parallelism to retain refractory material therebetween.

4. A thermocouple head comprising a pipe having a bent portion between its ends, a skid attached to said pipe and comprising a sheet metal body, said body having an elongated relatively narrow portion bent to conform generally to the bent portion of the pipe and spaced on one side and outwardly of said pipe portion, pairs of legs adjacent to each end of said skid and secured to the pipe near each end of said

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bent portion and portions projecting from the ends of said body toward the pipe, the side edges of said body between the said pairs of legs being bent inwardly into approximate parallelism, and refractory material encasing said pipe and skid and filling the space therebetween.

5. In a thermocouple head assembly including a bent pipe, a graphite sleeve disposed adjacent to the hot end of the pipe, and means including a tube secured within the sleeve and a coupling for connecting the pipe and sleeve together to define a continuous passageway, the combination of skid means for the said assembly comprising an elongated sheet metal body, said skid having a portion spaced from the pipe for engagement with a supporting structure for said head assembly and having a plurality of legs extending between said spaced portion and the pipe and secured rigidly to the pipe.

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