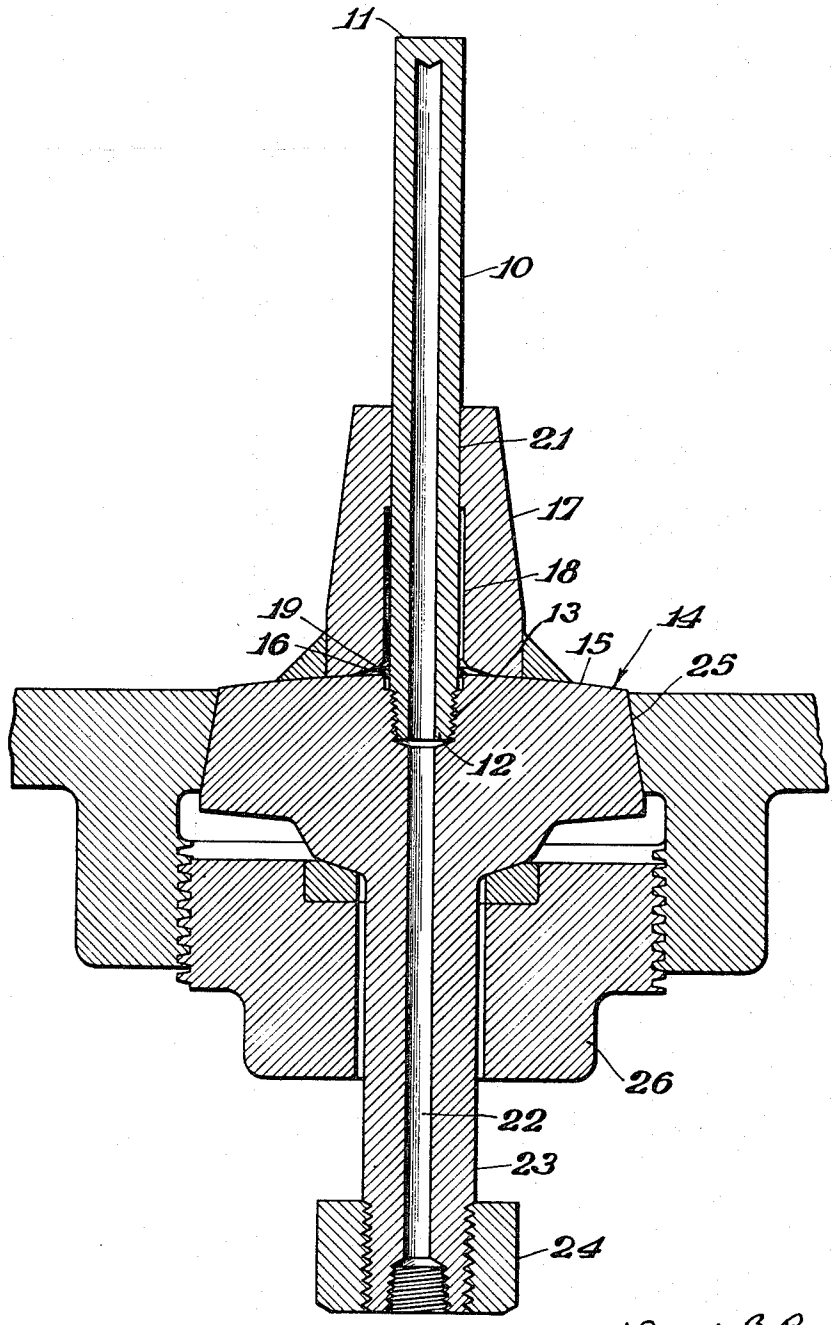
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TEMPERATURE MEASURING DEVICE

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TEMPERATURE MEASURING DEVICE

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3 Claims. (Cl. 136—4)

The present invention relates to pyrometer wells and particularly to assemblies including such wells which are adapted to receive thermocouple junctions.

Pyrometer well failure has been the cause of numerous shutdowns, seriously impairing the efficiency of large and expensive manufacturing units. These well failures are attributed to the improper mounting and reinforcing of the well relative to its support, and to the fabrication of the well from alloys not having the requisite characteristics of resistance against embrittlement and corrosion, and not having the proper coefficients of expansion and contraction.

It is an object of the present invention to provide a pyrometer well and support therefore which results in an assembly free from the above defects.

It is a further object of the present invention to provide a pyrometer well assembly which will effectively resist the intense heat, corrosion, vibration, and other conditions to which it may be subjected, and which assembly is relatively free from becoming stuck because of deposits from the process involved.

It is a still further object of the present invention to provide a pyrometer well assembly wherein the well is composed of certain novel alloys which give to it the desired characteristics of resistance to corrosion, embrittlement, and carbon deposits, as well as imparting thereto the proper expansion and contraction characteristics, and wherein the well is effectively supported and reinforced against failure due to vibration and other stresses.

Reference is made to the drawing which shows a longitudinal cross-sectional view of a pyrometer well assembly disclosing a preferred embodiment of my invention. A tubular well 10 is closed at its exposed end 11 and exteriorly threaded on its open end 12 for reception in a threaded opening 13 in a base or plug member 14 for support thereon. The threaded opening 13 in the base member 14 is countersunk and all thread marks on the well positioned below the surface 15 of the base member 14. A seal weld 16 is provided between the base member 14 and the well above the thread marks.

A collar member 17 surrounds the lower portion of the well 10 for reinforcing it in a novel manner. This collar is fabricated from a piece of solid cylindrical stock, preferably of the same alloy as that of which the base 14 is composed, and having a diameter of the order of three times that of the outside diameter of the well. A longitudinal opening is drilled or otherwise formed therein having a diameter slightly less than the outside diameter of the well. The greater portion of this opening, beginning at the base of the collar, is countersunk to a diameter slightly greater than that of the well 10 to provide an annular space between the well 10 and wall 18, the lower portion of this inner wall 18 being diverged as indicated at 19 to allow ample room for the seal weld 16. The upper portion of the vertical opening in the collar is reamed to provide a press or drive fit 21 with the intermediate portion of the tubular well 10. The lower outer periphery of the collar is welded to the base member 14 and the upper outer periphery is converged to a wall thickness of the order of half that at its base. This relationship furnishes the desired reinforcement of the well while at the same time providing for slight relative movement between the intermediate portion of the well and its collar under intense heat conditions. The base member 14 is provided with a relatively small opening 22 therethrough communicating with the open end 12 of the tubular well and providing for the introduction of a temperature responsive element as for example, a thermocouple junction. The protuberance 23 extends from the back side of the base member 14 and has threaded thereto the usual form of junction 24 adapted for connection to a conduit (not shown) leading to a control station. The outer periphery of the base member 14 converges in the direction of the tubular well 10 and is received in a seat 25 of corresponding convergence for positioning the well in the hot zone, the temperature of which is to be measured. The outer periphery of the base member 14 and its seat 25 are ground to provide a close fit for preventing access therebetween of deposits from the process undergoing heat treatment as for example, carbon deposits from a petroleum process. The seat 25 is shown as formed in the return bend of a tubular furnace header and there is provided the usual form of holding nut 26 for holding the base member in its seat. This particular location of my assembly is shown by way of example only since it is apparent that this seat may just as readily be formed in an opening in the wall of any vessel or in an auxiliary member attached to a suitable opening in such a vessel and since the adaptation to particular use is no part of the present invention, further detailed description thereof will not be made.

I have found that when the well 10 of my assembly is composed of an alloy still containing

4 to 6 percent chromium, 0.4 to 0.6 percent, preferably 0.5 percent, molybdenum with a maximum allowable carbon content of 0.15 percent, and the remainder substantially iron, that a marked increase in life and efficiency is realized. This alloy shows unusual qualities of resistance to embrittlement, corrosion and carbon deposits as well as optimum expansion and contraction characteristics. The present arrangement of structure has the advantage that the above relatively expensive alloy need be employed only in the fabrication of the pyrometer well, the reinforcing collar and base member being quite satisfactory when made of some relatively less expensive alloy, preferably the same as that of which the associated vessel is composed.

While I have described my invention in connection with a particular embodiment thereof, it is to be understood that this is by way of illustration rather than by way of limitation and that I do not intend to be limited thereby further than as evidenced by the appended claims.

I claim:

1. A thermocouple well assembly adapted for use under severe heat conditions including a base member, means whereby said base member may be secured in an opening formed in a boundary surface of a hot zone to form part of the boundary surface, said base member being provided with a passageway therethrough for the introduction of a heat responsive element into the thermocouple well assembly, a portion of said passageway being threaded, a tubular thermocouple well open at one end and closed at the other end, said open end being exteriorly threaded and received in said threaded portion of said passageway, a portion of said threads in said passageway near one surface of said base member being cut away to form a space around said thermocouple well, and a seal weld connecting the outer periphery of said thermocouple well to said base member, said seal weld extending into said space between said thermocouple well and said base member, a collar member extending from said base member and having a portion at one end tightly engaging said thermocouple well intermediate the ends thereof for reinforcing said thermocouple well while at the same time permitting movement between said thermocouple well and said collar member in use, said collar member at its other end being welded at its outer periphery to said base member.

2. A thermocouple well assembly adapted for use under severe heat conditions including a base member, means whereby said base member may be secured in an opening formed in a boundary surface of a hot zone to form part of the boundary surface, said base member being provided with a passageway therethrough for the introduction of a heat responsive element into the thermocouple well assembly, a portion of said passageway being threaded, a tubular thermocouple well open at one end and closed at the other end, said open end being exteriorly threaded and received in said threaded portion of said passageway, a portion of said threads in said passageway near one surface of said base member being cut away to form a space around said thermocouple well, and a seal weld connecting the outer periphery of said thermocouple well to said base member, said seal weld extending into said space between said thermocouple well and said base member, a collar member extending from said base member and having a portion at one end tightly engaging said thermocouple well intermediate the ends thereof for reinforcing said thermocouple well while at the same time permitting movement between said thermocouple well and said collar member in use, said collar member having another portion at its other end which is spaced from said thermocouple well to provide room for said seal weld between said thermocouple well and said base member.

3. A thermocouple well assembly adapted for use under severe heat conditions including a base member, means whereby said base member may be secured in an opening formed in a boundary surface of a hot zone to form a part of the boundary surface, said base member being provided with a passageway therethrough for the introduction of a heat responsive element into the thermocouple well assembly, a portion of said passageway being threaded, a tubular thermocouple well open at one end and closed at the other end, said open end being exteriorly threaded and received in said threaded portion of said passageway, a portion of said threads in said passageway near one surface of said base member being cut away to form a space around said thermocouple well, and a seal weld connecting the outer periphery of said thermocouple well to said base member, said seal weld extending into said space between said thermocouple well and said base member, a collar member extending from said base member and having a portion tightly engaging said thermocouple well intermediate the ends thereof for reinforcing said thermocouple well while at the same time permitting movement between said thermocouple well and said collar member in use, said collar member having another portion which is spaced from said thermocouple well to provide room for said seal weld between said thermocouple well and said base member, the outer portion of said collar member adjacent said base member being connected to said base member by a weld, said collar member and said base member being made of the same material.

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