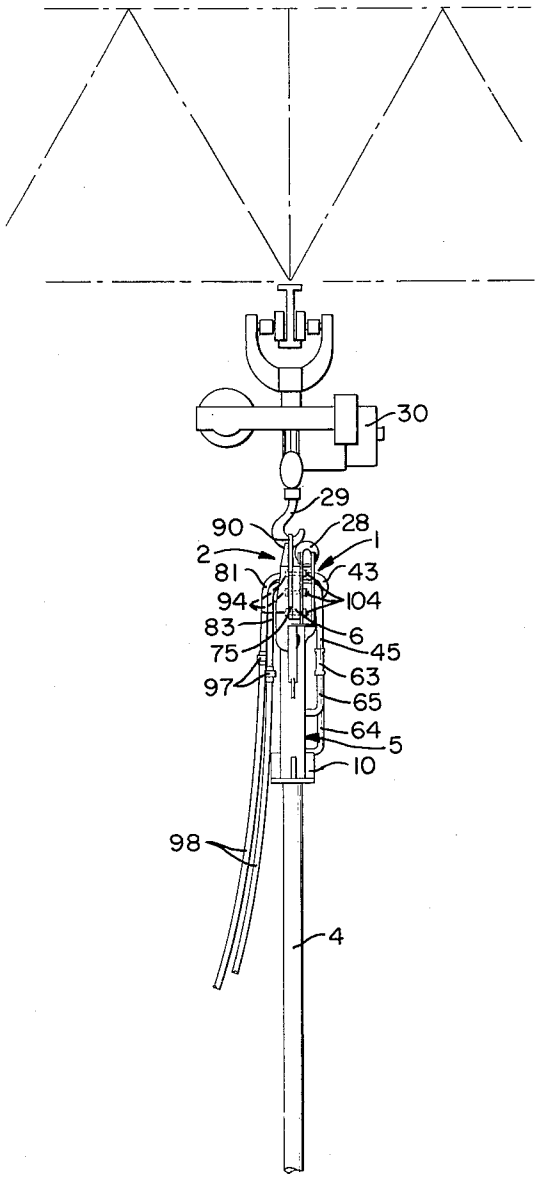
Dec. 19, 1961 E. E. HAJEK ET AL 3,013,788

METALLURGY

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FIG. 1.



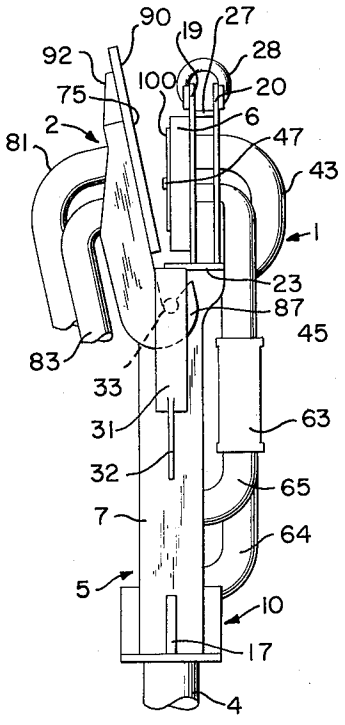


FIG. 2.

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FIG. 3.

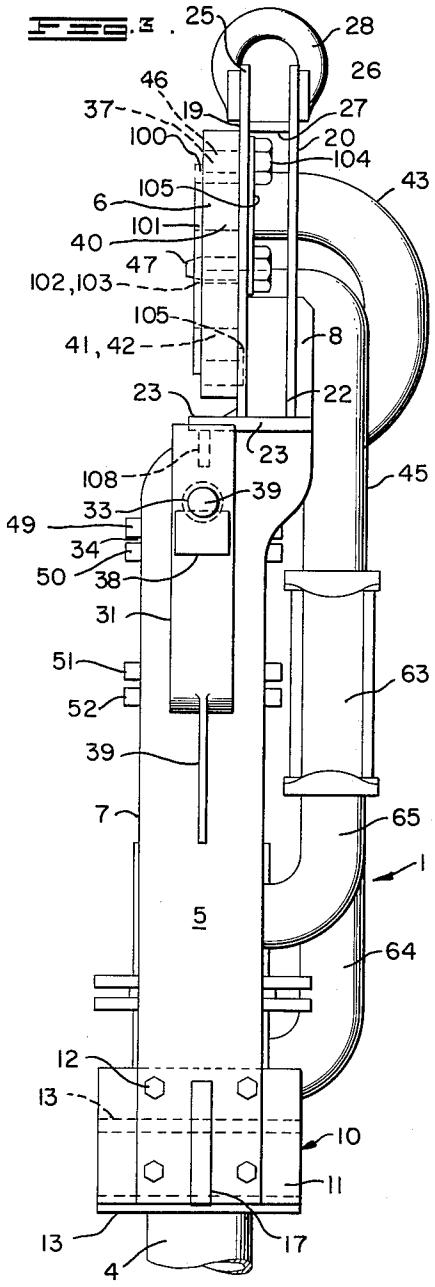
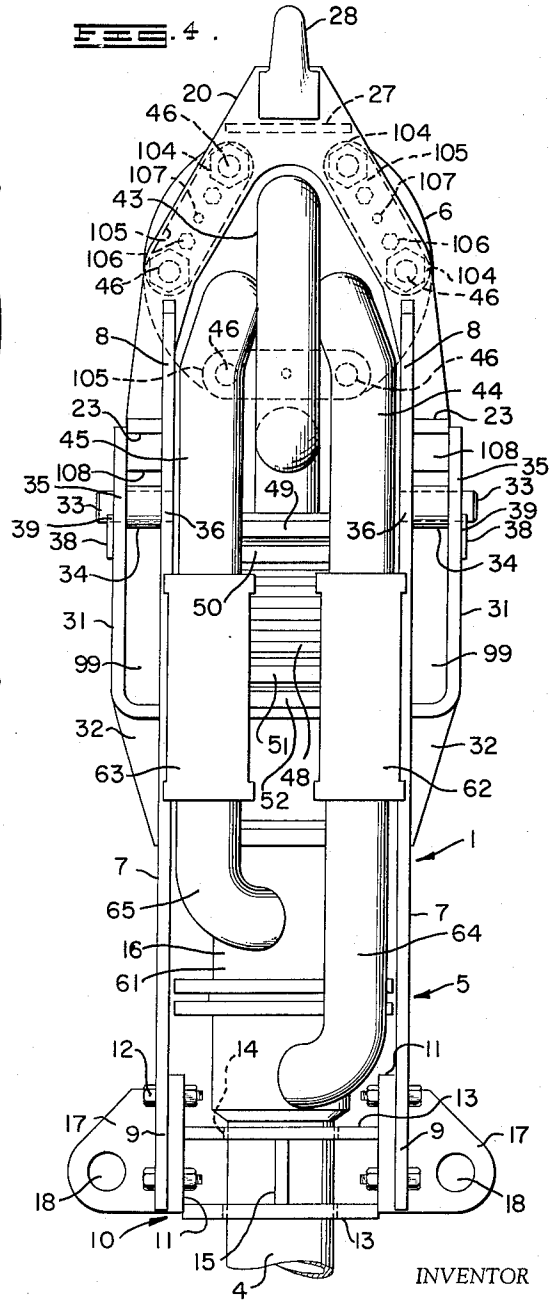


FIG. 4.



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FIG. 6.

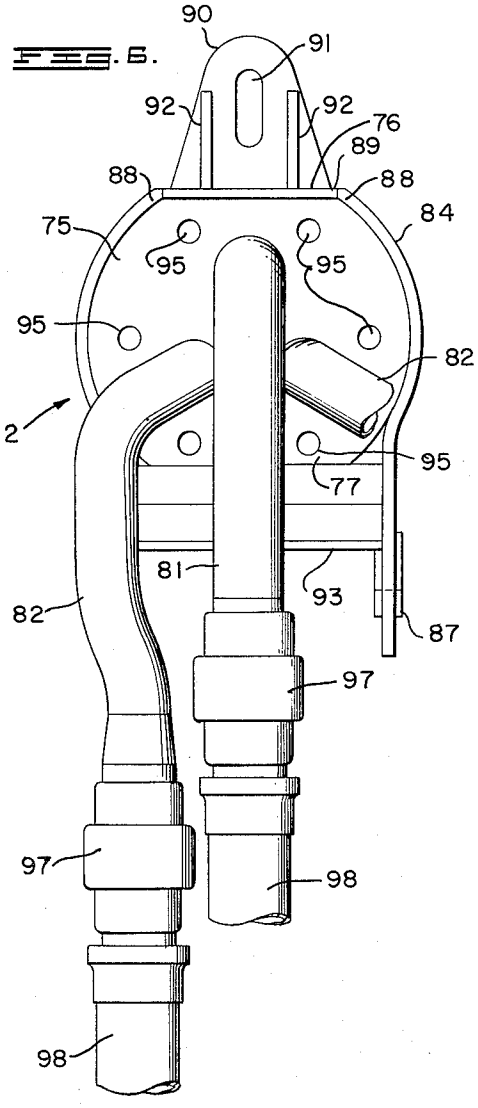
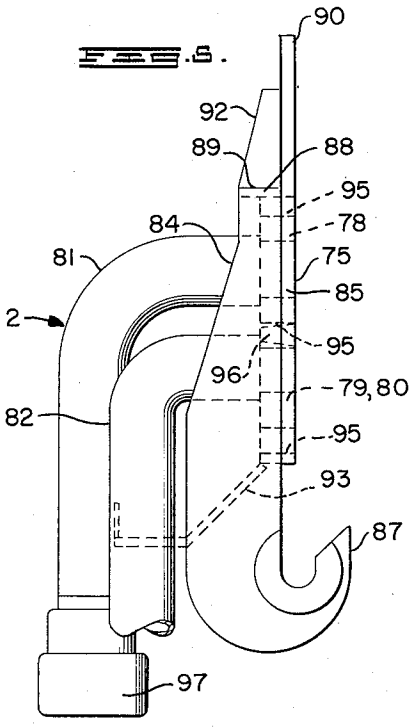


FIG. 5.



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United States Patent Office 3,013,788 Patented Dec. 19, 1961

3,013,788

METALLURGY

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Filed Feb. 8, 1960, Ser. No. 7,274
13 Claims. (Cl. 266—34)

This invention relates to connecting and disconnecting fluid conduit means. More particularly, this invention relates to a device for connecting and disconnecting a plurality of fluid conduits without the necessity of separately connecting and disconnecting each individual conduit.

In many industrial processes, it is necessary to provide apparatus involving the use of fluid conduits and wherein means for connecting and disconnecting said conduits are required. For example, in recent years oxygen or oxygen-enriched air has been reacted with a molten pig iron charge by means of a tube or lance which is introduced into the highly heated interior of a vessel or furnace. Such lances are presently used in the open hearth steel refining process for decreasing the time of refining and in the steel refining processes wherein oxygen or oxygen-enriched air is used as the primary refining means to develop the heat necessary for refining by oxidation of the impurities in the molten metal. During the refining operation in the latter-mentioned processes, the nozzle of the lance may be either submerged below the molten metal surface or be located above the surface. One example of such a process is the L–D process wherein the molten metal surface is blown with oxygen as set forth in U.S. Patent No. 2,800,631. As will be apparent, the lances employed in such operations are subjected to extremely high temperatures which deleteriously affect the life and service thereof. For example, in the L–D process the lance introducing oxygen or oxygen-enriched air into the interior of the furnace is subjected to temperatures on the order of 2500 to 3000° F. To withstand these temperatures, the lance is subjected to cooling by a fluid medium, usually water.

In its basic form, a lance of the type described comprises a plurality of relatively long conduits of progressively varying diameters arranged in coaxial relationship. A center conduit provides a passage whereby oxygen, which is introduced in the upper end of the lance, travels the entire length thereof and is discharged into the furnace during the refining process. A cooling fluid jacket comprising a second and a third conduit in coaxial relationship with the central conduit is of such size as to form two separate concentric spaces within the lance. These spaces being connected at their lower ends permit fluid, which is introduced into one of said spaces at the upper end of the lance, to flow downward to its lower extremity, enter the other of said spaces and return to the upper end at which point it is piped to a further point of disposal.

As mentioned hereinbefore, the fluid employed for such purpose is usually water which is employed to protect the lance from the effects of extreme heat to which it is subjected while in service. Each time a furnace begins a further cycle of operations the lance, which has previously been hoisted out of and clear of the furnace, must again be lowered into position in order to perform its function. The distance through which the lance is hoisted and its other movements incidental to its normal operation will make it apparent that the furnishing of oxygen and cooling fluid to the lance requires the use of flexible hoses arranged with loops making the over-all length of relatively large magnitude. Due to the extremely adverse conditions under which they operate, the service life of these lances is limited and periodic replacement is generally required. Up to the present time the task of changing lances has been accomplished by lifting the lance and its attached fluid supply hoses from its hoist by an auxiliary hoist. The attached hoses then must be separately and individually disconnected before the lance can be removed from the immediate vicinity for rebuilding and necessary maintenance work. Although means of disconnecting are provided for each of the three hoses, the cumbersome nature of these elements, due to their relatively heavy weight, long length and limited flexibility, renders a lance changing operation a time consuming and extremely arduous task.

Accordingly, its is the purpose of this invention to provide an improved means for connecting and disconnecting a plurality of fluid conduits and particularly fluid conduits for supplying processing apparatus such as a liquid jacketed lance for treating molten metal with a gas and/or other material and wherein the necessity of separately connecting and disconnecting each individual conduit is eliminated.

The various advantages of the invention will become more apparent from a review of the following detailed description when taken in conjunction with the accompanying drawings wherein:

FIGURE 1 is a fragmentary, elevational view of a device embodying the principles of this invention as applied to an oxygen lance for a steel refining operation when suspended from a suitable supporting means.

FIGURE 2 is an enlarged fragmentary, elevational view of the device of FIGURE 1 illustrating the position assumed by the two separable assemblies thereof upon unbolting.

FIGURE 3 is an enlarged fragmentary, elevational view of the separable assembly at the right of FIGURE 2 when viewed in the same direction as FIGURE 2.

FIGURE 4 is a fragmentary, elevational view of the separable assembly of FIGURE 3 when viewed from the right of FIGURE 3.

FIGURE 5 is an enlarged elevational view of the separable assembly at the left of FIGURE 2 when viewed from the same direction as FIGURE 2.

FIGURE 6 is an elevational view of the separable assembly shown in FIGURE 5 when viewed from the left of FIGURE 5.

Referring to the drawings, in which the same reference numerals have been applied to like parts in the various views, it will be observed that the device of the instant invention includes a pair of separable assemblies **1** and **2**.

With reference more particularly to FIGURES 3 and 4, it will be seen that when the device of this invention is applied for the connection of supply hoses or fluid conduits to an oxygen lance, assembly **1** includes the oxygen lance **4**, a suitable framework **5** and a flange **6**. Framework **5** comprises a pair of elongated members **7** arranged in confronting relationship with each other. At one end **8** thereof, the members **7** have a reverse curved configuration to provide space for flange **6**.

At the ends **9**, opposite ends **8**, members **7** are connected to a lance alignment means such as a removable box-like structure **10** comprising a pair of side members **11** in confronting relationship with each other and which are secured by means of bolts **12** to the inner surfaces of the members **7**. Side members **11** are symmetrical with respect to the center lines of members **7** and extend beyond the edge thereof. A pair of plates **13** disposed in a direction transverse to members **11** are affxed at their ends to side members **11** by suitable means such as welding. The plates **13** are provided with centrally located circular lance receiving openings **14**, are parallel with one another and are connected to each other by ribs **15** suitably affixed at their ends to plates **13**. Thus, elements

11, 13 and 15 form the aforementioned box-like structure 10 which when secured in place by means of the bolts 12 maintains the members 7 in correct spaced relationship, ensures true alignment of the lance 4 which passes through openings 14 thereby ensuring true alignment of the lance 4 in the assembled position.

It is preferred that the portion 16 of lance 4 which is disposed above structure 10, when framework 5 and lance 4 are suspended in the vertical position, have a diameter larger than that of openings 14 thereby preventing portion 16 from passing through opening 14 whereby the lance may be supported in the vertical position by box-like structure 10 and framework 5.

A pair of lugs 17 having apertures 18 therein are affixed to members 7 and extend laterally outward therefrom.

The end of framework 5 opposite that to which structure 10 is affixed includes a pair of bifurcated members 19 and 20 of a generally inverted U-shaped configuration spaced apart and in confronting relationship with one another. Bifurcated members 19 and 20 are arranged symmetrically about a vertical median line and diverge in a direction toward box-like structure 10. The confronting divergent ends 21 and 22 of members 19 and 20 are connected in pairs by two members 23 which abut and are affixed to the ends 21 and 22 of members 19 and 20 by suitable means such as welding and extend beyond said members. The divergent ends 21 and 22 and members 23 are affixed to the ends 8 of members 7 by suitable means such as welding.

The converging portions 25 and 26 of bifurcated members 19 and 20 are connected by an element 27 which extends across the space between said members and is affixed at its ends to the inside faces of said members. A suitable supporting means such as a lifting shackle 28 for engaging framework 5 with the hook of an independent maintenance or auxiliary lifting and lowering means (not shown) is affixed to one end of framework 5, i.e. the converging portions 25 and 26 of both bifurcated members 19 and 20.

Extending downwardly from the outer edges of the members 23, and to which they are affixed by suitable means, are a pair of elongated members 31. Members 31 are disposed parallel to members 7, are spaced apart therefrom and at their lower ends are bent inwardly and affixed to members 7. Suitable ribs 32 and 108 are affixed to members 31 and 7 to provide increased rigidity of the assembled framework 5.

A pair of horizontal pins 33 having aligned axes provided with concentric bushings 34 slidably mounted thereon are mounted in aligned apertures 35 and 36 defined within vertical members 31 and 7 on either side of framework 5 with the axes of pins 33 transverse to the longitudinal dimension of framework 5 and parallel to the face 37 of flange 6. Pins 33 are held in place by keeper plates 38 which engage slots 39 in pins 33. The plates 38 are affixed to members 31.

Flange 6 is provided with three openings 40, 41 and 42 defined therein and passing therethrough. An oxygen supply conduit or pipe 43, a water inlet conduit or pipe 44 and a water outlet conduit or pipe 45 are affixed at one end thereof to flange 6 in registration or fluid flow relationship with openings 40, 41 and 42, respectively, whereby the openings are in open communication with the interiors of the respective pipes 43, 44 and 45. Flange 6 is also provided with a plurality of bolt receiving apertures 46. A centrally located tapered dowel 47 is affixed to the face 37 of the flange 6 opposite that to which the pipes 43, 44 and 45 are affixed.

The oxygen supply pipe 43 is connected to the lance 4 through a conventional expansion joint 48 by means of flanges 49, 50, 51 and 52 affixed, respectively, to the inlet end of pipe 43, both ends of expansion joint 48 and the inlet end of lance 4. Pipe 43 when connected is in open communication with the interior of the gas supply conduit (not shown) of lance 4. The water inlet and outlet pipes 44 and 45 are connected to the jacket 61 of the lance through the respective, conventional expansion joints 62 and 63 and pipes 64 and 65 which are affixed to jacket 61. Pipe 64 is in open communication with the inner concentric space (not shown) and pipe 65 is in open communication with the outer concentric space (not shown) of the lance.

Referring now more particularly to FIGURES 5 and 6, it will be seen that assembly 2 comprises a flange 75 which can be characterized by a generally circular configuration, but having a pair of opposed parallel flat edges 76 and 77 and including openings 78, 79 and 80 defined therein and passing therethrough adapted for alignment with openings 40, 41 and 42 in flange 6. An oxygen inlet conduit or pipe 81 and cooling water inlet and outlet conduits or pipes 82 and 83, respectively, are affixed at one end thereof to flange 75 in registration or fluid flow relationship with openings 78, 79 and 80 whereby these openings are in open communication with the interior of their respective pipes 81, 82 and 83, and these pipes are so located on flange 75 that they register with their respective pipes 43, 44 and 45 when flanges 6 and 75 are joined in the manner to be described below.

A pair of diametrically opposed elongated plates 84 have one portion of each affixed to opposite peripheries of flange 75. Plates 84 project perpendicularly away from the joining face 85 of flange 75 in the direction of pipes 81, 82 and 83 and extend longitudinally with respect to flange 75 beyond one flat edge 77 thereof terminating in a pair of integral aligned hooks 87. The open portion of the hooks is directed toward the face 85 of flange 75 opposite that to which pipes 81, 82 and 83 extend. The hooks are adapted to engage pins 33 of assembly 1 in a manner whereby upon engagement and rotation flange 75 is easily positioned for registration with flange 6 with openings 78, 79 and 80 mating with respective openings 40, 41 and 42. The portions of plates 84 which extend beyond edge 77 of flange 75 are parallel to one another. The ends 88 of plates 84 opposite hooks 87 terminate coincident with the horizontal flat edge 76 on flange 75. At these ends 88 the plates 84 are connected by a transverse plate 89 which extends across flat edge 76 of flange 75 and is affixed along one edge thereof to flange 75 and at the ends thereof to ends 88 of plates 84 by suitable means such as welding.

Affixed to flange 75 is a means such as an eye 90, having an elongated aperture 91 therein for engaging an independent support or suspension means such as hook 29 of the operating lifting and lowering device 30. Suitable reinforcing ribs 92 can be affixed to eye 90 and to plate 89 to add rigidity to eye 90.

A channel-shaped structure 93 extends away from edge 77 of flange 75 in the direction of pipes 81, 82 and 83, and in the direction of hooks 87 and is affixed to edge 77 of flange 75, plates 84 and to pipes 81, 82 and 83. This structure 93, while forming a rigid assembly with its associated elements, also forms a trough or receptacle for the reception, at such times as the lance 4 is being changed, of bolts 94 which are used to secure the two separable assemblies 1 and 2 together.

Apertures 95 are provided in flange 75 to match apertures 46 in flange 6. Flange 75 is provided with an additional centrally located aperture 96 passing therethrough which mates with dowel 47 to ensure bringing about a proper alignment of flanges 6 and 75 when the assemblies are moved into operating position.

Pipes 81, 82 and 83 can be provided at their extremities, opposite those affixed to flange 75, with suitable coupling means 97 for connection to other fluid conduits which in the present embodiment of this invention for supplying an oxygen lance would be flexible conduits such as hoses 98.

Securing the two assemblies together is accomplished

in the following manner. Through the use of shackle 28 and eye 90, together with their respective lifting and lowering means, hooks 87 are removably engaged with pins 33 and bushings 34 by passing them through spaces 99 between members 31 and 7 and slightly lowering assembly 1 relative to assembly 2, the assemblies then being in a position as shown in FIGURE 2 and wherein the angle of flange 75 relative to flange 6 results from the designed center of gravity of assembly 2 as will be discussed further hereinafter. Thereafter assembly 2 is in effect rotated or pivoted to the right in order to move flanges 6 and 75 together into essentially parallel relationship with dowel 47 passing into aperture 96. Such relative movement of the two flanges occurs to a substantial degree by releasing the supporting effect of the maintenance hoist relative to shackle 28 of assembly 1. By so doing, the entire weight of assembly 1 bears on hooks 87 of assembly 2 causing the flanges to move together.

For purposes of ensuring a fluid tight seal a gasket 100 is provided between flanges 6 and 75 and preferably is affixed by suitable means such as bonding to one of them, e.g. flange 6 as shown in FIGURES 2 and 3, said gasket having openings 101, 102 and 103 which register with the openings 40, 41 and 42 in flange 6 and the openings 78, 79 and 80 in flange 75. The two assemblies are then secured together by introducing bolts 94 through the apertures 46 in flange 6 and apertures 95 in flange 75 and in the case of the apertures 46 closest to shackle 28 the bolts 94 also pass through bifurcated member 19 and in all cases are engaged by nuts 104. Upon tightening of the bolts 94, the two flanges 6 and 75, the bifurcated member 19 and consequently the framework 5 and the entire assemblies 1 and 2 are positively and firmly secured together, forming in effect an integral fluid tight unit, the flanges then being in essentially parallel relationship. The nuts 104 are arranged in pairs and preferably are affixed to suitable mounting plates 105 by suitable means such as welding. These plates 105 are removably affixed to bifurcated member 19 in the case of the apertures 46 closest to shackle 28 and to the flange 6 in the case of the other apertures 46. Attachment is made by means of cap screws 106 which are threaded into tapped openings (not shown) in bifurcated member 19 and flange 6, and alignment is ensured by means of dowels 107 and matching apertures (not shown) in bifurcated member 19 and flange 6. This arrangement, while holding the nuts in place in alignment with the apertures 46 and 95 in the flanges, also permits tightening of the bolts 94 from the supply hose flange side, i.e. flange 75, without the use of a wrench to prevent turning of the nuts. It is apparent that the method of securing the flanges may be somewhat simplified as for instance welding bifurcated member 19 to flange 6 and/or providing tapped holes in one or the other of the flanges 6 and 75 thereby dispensing with the need for nuts 104. However, the preferred embodiment is anticipatory of contingencies such as failure through continued usage of such elements as internal screw threads and therefore the present design is such that any wear which may result can be corrected promptly and with minimum replacement of parts.

Preferably, the weight distribution of assembly 2, including the effect of hoses 98, is such that when the lance is in raised position preparatory to removal from assembly 2 the center of gravity of said assembly is located to the left of flange 75, as viewed in FIGURE 1, and at a point resulting in a tendency for flange 75, when in assembled position, to rotate or pivot to the left about pin 33. At such time as a hook or other means is passed through shackle 28 for support of the assembly independent of assembly 2 and bolts 94 removed, the center of gravity of assembly 2 immediately causes flange 75 to rotate or pivot away from flange 6, as shown in FIGURE 2. The support means for assembly 1 then need only be actuated to raise the assembly slightly in order for pins 33 to be raised clear of hook 87 and then moved to the right to accomplish complete separation of the assemblies. Normally, assembly 2 and its support means will remain in the same position awaiting re-connection to assembly 1 or to a standby assembly 1.

From the above description and the accompanying drawings it is apparent that by employment of the connecting device of this invention the necessity to separately connect and disconnect individually the long and unwieldly flexible hoses is eliminated thus rendering the task of lance replacement a relatively simple matter as compared to the prior art practice.

While there has been disclosed a preferred embodiment of this invention, it should be understood that various modifications may be made thereto within the spirit and scope of the appended claims.

What is claimed is:

1. A device for connecting and disconnecting fluid conduit means comprising a pair of separable assemblies, the first of said assemblies comprising a first flange provided with at least one opening therethrough, fluid conduit means affixed at one end thereof to said first flange in registration with said opening, and pin means, the second of said assemblies comprising a second flange which is provided with at least one opening therethrough corresponding to, and adapted for alignment with, the opening in said first flange when the flanges are in essentially parallel relationship, fluid conduit means affixed at one end thereof to said second flange in registration with said opening in said second flange, hook means, said hook means being adapted to removably engage said pin means of said first assembly in a manner whereby said second flange may be rotated away from, and be at an angle to, said first flange or, conversely, rotated toward, and be essentially parallel to, said first flange with said fluid conduit means being in registration, and means for fastening together and unfastening said flanges when in essentially parallel relationship, the center of gravity of said second assembly being located at a point such that upon unfastening the flanges with the assemblies suspended from independent supporting means the flange of said second assembly will rotate away from said first flange and the assemblies readily disconnected.

2. A device according to claim 1 wherein said first and second flanges each are provided with a plurality of openings therethrough, a fluid conduit means affixed at one end thereof to each flange in registration with each opening, the location of each opening in one flange being in alignment with an opening in the other flange when said flanges are in essentially parallel relationship.

3. A device for connecting and disconnecting fluid conduit means comprising a pair of separable assemblies, the first of said assemblies comprising a first flange provided with at least one opening therethrough, fluid conduit means affixed at one end thereof to said first flange in fluid flow relationship with said opening and pin means in spaced relation to, and below, said first flange, the second of said assemblies comprising a second flange provided with at least one opening therethrough corresponding to, and adapted for alignment with, the opening in said first flange when the flanges are in essentially parallel relationship, fluid conduit means affixed at one end thereof to said second flange in fluid flow relationship with said opening in said second flange, hook means extending downwardly of said second flange being adapted to engage said pin means of said first assembly in a manner whereby said second flange may be rotated away from, and be at an angle to, said first flange or, conversely, rotated toward, and be essentially parallel to, said first flange with said fluid conduit means being in registration, independent supporting means for each of said assemblies, and means for fastening together and unfastening said flanges when in essentially parallel rela-

tionship, the center of gravity of said second assembly being located at a point such that upon unfastening the flanges with the assemblies suspended from said independent supporting means the flange of said second assembly will rotate away from said first flange and said assemblies readily disconnected.

4. A device according to claim 3 wherein said first and second flanges each are provided with a plurality of openings therethrough, a fluid conduit means affixed at one end thereof to each flange in fluid flow relationship with each opening, the location of each opening in one flange being in alignment with an opening in the other flange when said flanges are in essentially parallel relationship.

5. The device according to claim 3 wherein said means for fastening together and unfastening said flanges comprises bolt and nut means, said flanges being provided with mating apertures therein adapted for passage of said bolt means.

6. The device according to claim 3 wherein said hook means comprises a pair of opposed plates having one portion of each affixed to opposite portions of said second flange and which extend longitudinally with respect to said second flange and terminating in a pair of integral aligned hooks.

7. The device according to claim 3 wherein a centrally located dowel is affixed to the face of said first flange opposite that to which said fluid conduits are affixed and wherein said second flange is provided with an aperture passing therethrough which mates with said dowel when said flanges are fastened together.

8. A device for connecting and disconnecting a plurality of fluid conduits comprising a pair of separable assemblies, the first of said assemblies in turn comprising a framing means, a first flange mounted on said framing means and provided with a plurality of openings therethrough, a plurality of fluid conduits affixed at one end thereof to said first flange in fluid flow relationship with said openings in said first flange, means affixed to one end of said framing means for engaging said framing means with a supporting means and pin means having aligned axes mounted on either side of said framing means, the axes of said pin means being transverse to the longitudinal dimension of said framing means, parallel to the face of said first flange and spaced from said first flange in a longitudinal direction with respect to said framing means opposite said means for engaging said framing means with a supporting means, the second of said assemblies comprising a second flange adapted to engage said first flange, said second flange being provided with openings therethrough corresponding to the openings in said first flange and adapted for alignment with said openings in said first flange, fluid conduits affixed at one end thereof to said second flange in fluid flow relationship with said openings in said second flange, means affixed to one edge of said second flange for engaging said second flange with a supporting means, a pair of spaced hook means affixed to said second flange extending downwardly from the edge thereof opposite to said means for engaging said flange with the supporting means, said hook means being adapted to removably engage said pin means of said first assembly in a manner whereby upon such engagement of said hook means about said pin means said second flange is easily positioned in essentially parallel relationship with said first flange such that said openings in said flanges mate with each other, gasket means provided between said first and second flanges and means for readily fastening together and unfastening said flanges.

9. A device for connecting and disconnecting a plurality of fluid conduits supplying a liquid jacketed lance for blowing molten metal with a gas comprising a pair of separable assemblies, the first of said assemblies comprising a framing means, said gas supplying lance mounted at one end of said framing means and a first flange mounted at the other end of said framing means, said first flange being provided with three openings therethrough, a fluid conduit affixed at one end thereof to said first flange and in fluid flow relationship with each of said openings, each of said fluid conduits being connected to said lance, one of said conduits being connected in fluid flow relationship with a gas passage in said lance, the other two conduits being connected in fluid flow relationship with the liquid jacket of said lance, one of said latter conduits serving as a liquid supply, the other as a liquid return, means for engaging said framing means with a supporting means affixed to the end of said framing means opposite that on which said lance is mounted, and pin means having aligned axes mounted on either side of said framing means, the axes of said pin means being transverse to the longitudinal dimension of said framing means, parallel to the face of said first flange, and spaced from said first flange in the direction of said lance, the second of said separable assemblies comprising a second flange adapted to engage said first flange and being provided with three openings therethrough corresponding to the openings in said first flange and adapted for alignment with said openings in said first flange, a fluid conduit affixed at one end thereof to said second flange and in fluid flow relationship with each of said openings, one of said fluid conduits supplying gas to said lance and accordingly being affixed in fluid flow relationship with the proper opening in said second flange to supply gas to the conduit affixed to said first flange which is connected to the gas passage in said lance, the other two fluid conduits supplying and returning liquid to and from the liquid jacket of said lance and corresponding to the respective conduits affixed to said first flange for supplying and returning liquid to and from said jacket of said lance, means affixed to one edge of said second flange for engaging said second flange with a supporting means, a pair of spaced hook means affixed to said second flange and extending downwardly from the edge thereof opposite to said means for engaging said flange with the supporting means, said hook means being adapted to removably engage said pin means of said first assembly in a manner whereby upon engagement of said hook means with said pin means said second flange is easily positioned in essentially parallel relationship with said first flange such that the corresponding openings in said flanges mate with each other, gasket means provided between said first and second flanges and means for readily fastening together and unfastening said flanges.

10. The device according to claim 9 wherein expansion joint means are provided between said fluid conduits affixed to said first flange and said lance.

11. The device according to claim 10 wherein hose couplings are mounted on said fluid conduits affixed to said second flange and hoses are affixed to said hose couplings.

12. A device for connecting and disconnecting fluid conduit means comprising a pair of separable assemblies, the first of said assemblies comprising a first flange provided with at least one opening therethrough, fluid conduit means affixed at one end thereof to said first flange in fluid flow relationship with said opening and pin means in spaced relation to, and below, said first flange, the second of said assemblies comprising a second flange provided with at least one opening therethrough corresponding to, and adapted for alignment with, the opening in said first flange when the flanges are in essentially parallel relationship, fluid conduit means affixed at one end thereof to said second flange in fluid flow relationship with said opening in said second flange, hook means extending downwardly of said second flange being adapted to engage said pin means of said first assembly in a manner whereby said second flange may be rotated away from, and be at an angle to, said first flange or, conversely, rotated toward, and be essentially parallel to, said first flange with said fluid conduit means being in registration, independent

supporting means for suspending each of said assemblies, and means for fastening together and unfastening said flanges when in essentially parallel relationship.

13. A device for connecting and disconnecting flexible fluid conduit means comprising a replaceable first assembly and a second assembly, said replaceable first assembly comprising a first flange provided with at least one opening therethrough, flexible fluid conduit means affixed at one end thereof to said first flange in registration with said opening, and first assembly pin means, said replaceable first assembly being supported by said second assembly during operation in a manner whereby said first flange is in a substantially vertical position, a first assembly suspension means positioned above and independently suspending said first assembly during connection to and disconnection from said second assembly in a manner whereby said first flange is in a substantially vertical position, said second assembly comprising a second flange which is provided with at least one opening therethrough corresponding to, and adapted for alignment with, the opening in said first flange when said flanges are in essentially parallel relationship, flexible fluid conduit means affixed at one end thereof to said second flange in registration with said opening in said second flange, and second assembly hook means, a second assembly suspension means positioned above and suspending said second assembly in a manner whereby said second flange is in a substantially vertical position during operation and is positioned at an angle with the vertical during connection to and disconnection from said first assembly, and means for fastening together and unfastening said flanges when in essentially parallel relationship, said second assembly hook means being adapted to removably engage said first assembly pin means in a manner whereby said second flange may be rotated away from, and be at an angle to, said first flange or, conversely, rotated toward, and be essentially parallel to, said first flange with said flexible fluid conduit means being in registration, the center of gravity of said second assembly being located at a point such that upon unfastening the flanges, with said replaceable first assembly being suspended from said first assembly suspension means and said second assembly being suspended from said second assembly suspension means, said second flange will rotate away from, and be at an angle to, said first flange so that said assemblies may be readily disconnected by relative movement of said suspension means.

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793,655 Great Britain ---------- Apr. 23, 1958

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,013,788 December 19, 1961

Ernest E. Hajek et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, line 2, and in the heading to the printed specification, line 4, name of co-inventor, for "Ilya L. Krettinger", each occurrence, read -- Ilya L. Krettingen --.

Signed and sealed this 1st day of January 1963.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents