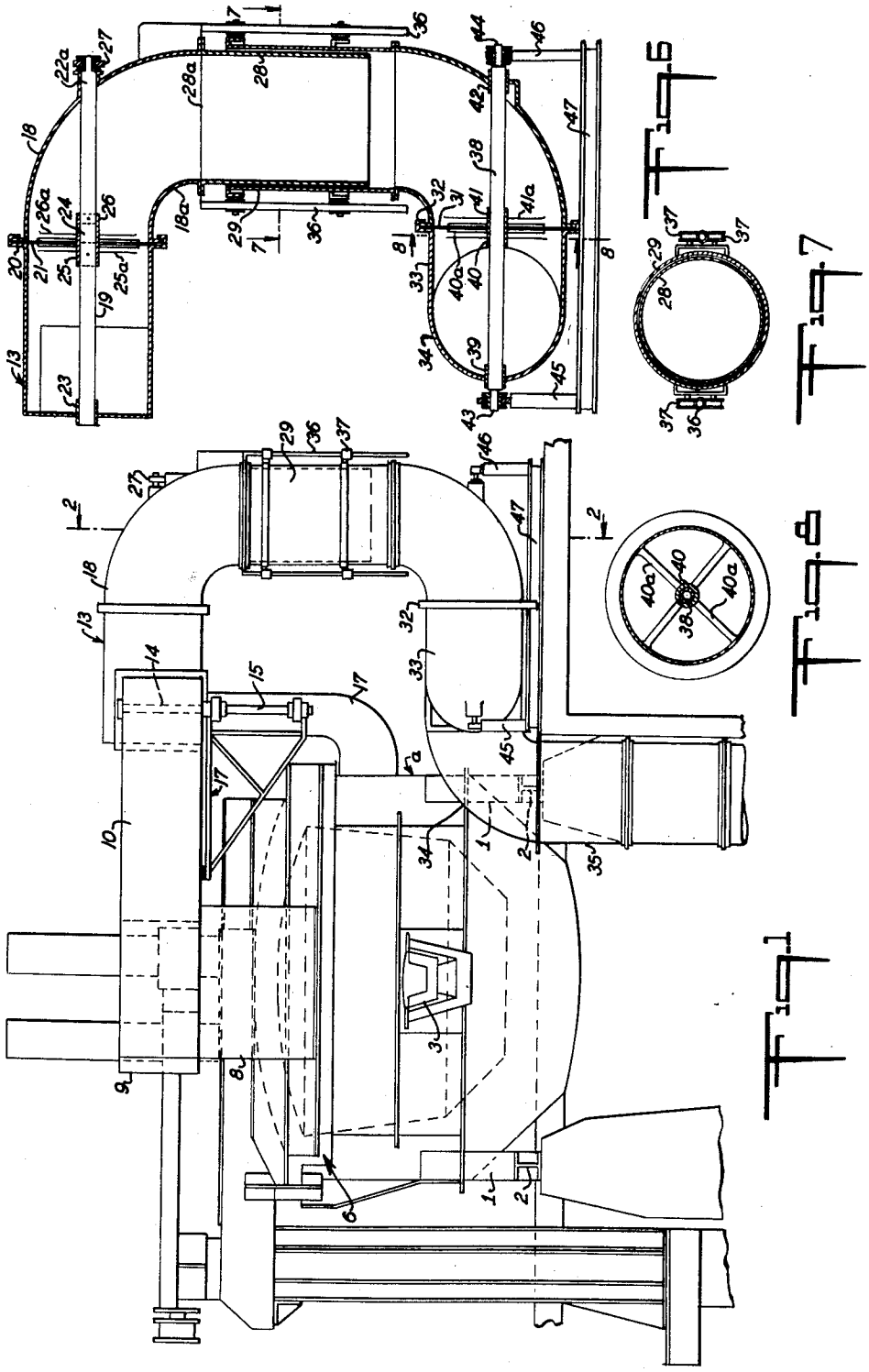
Oct. 13, 1959 G. DE DOMINICIS 2,908,737

SMOKE SUCTION INSTALLATION FOR ELECTRIC METAL MELTING FURNACES

Filed Feb. 8, 1957

5 Sheets-Sheet 1



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SMOKE SUCTION INSTALLATION FOR ELECTRIC METAL MELTING FURNACES

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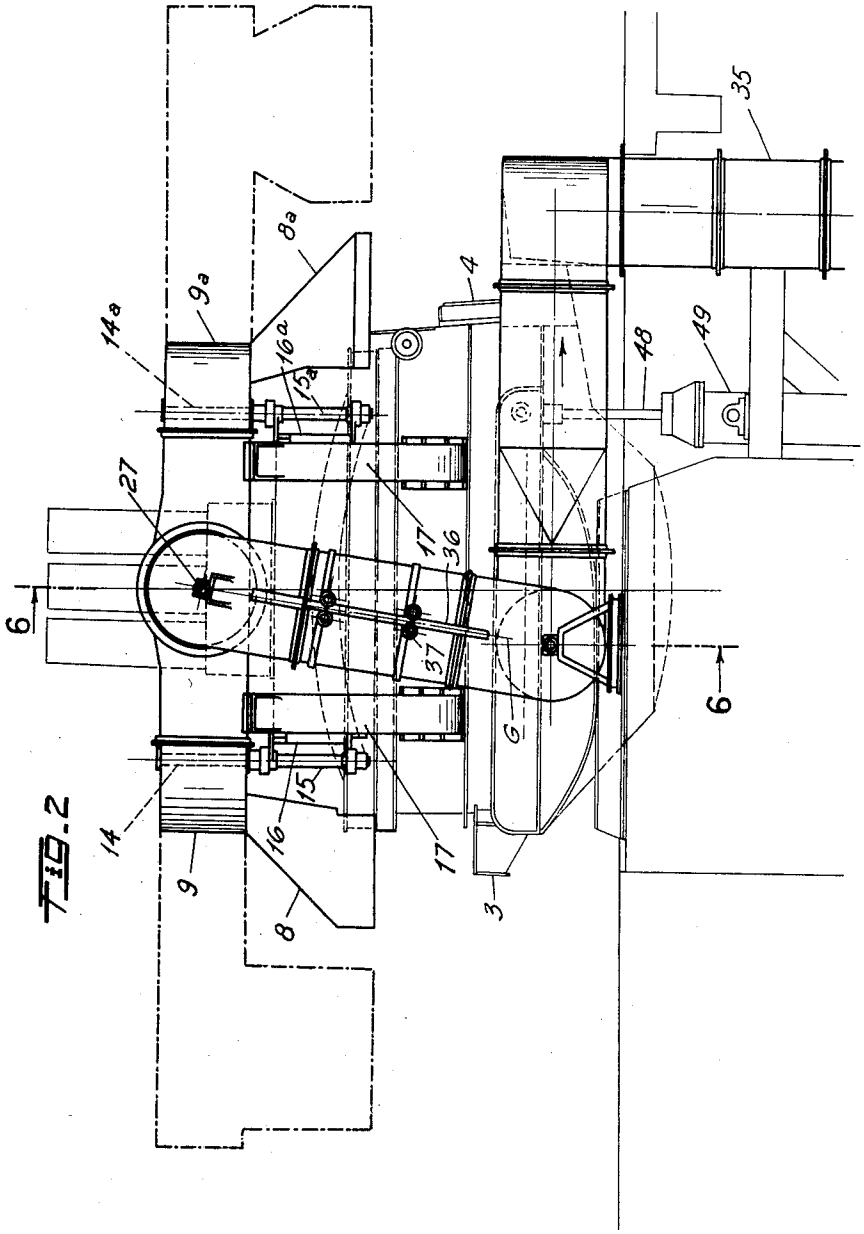


FIG. 2

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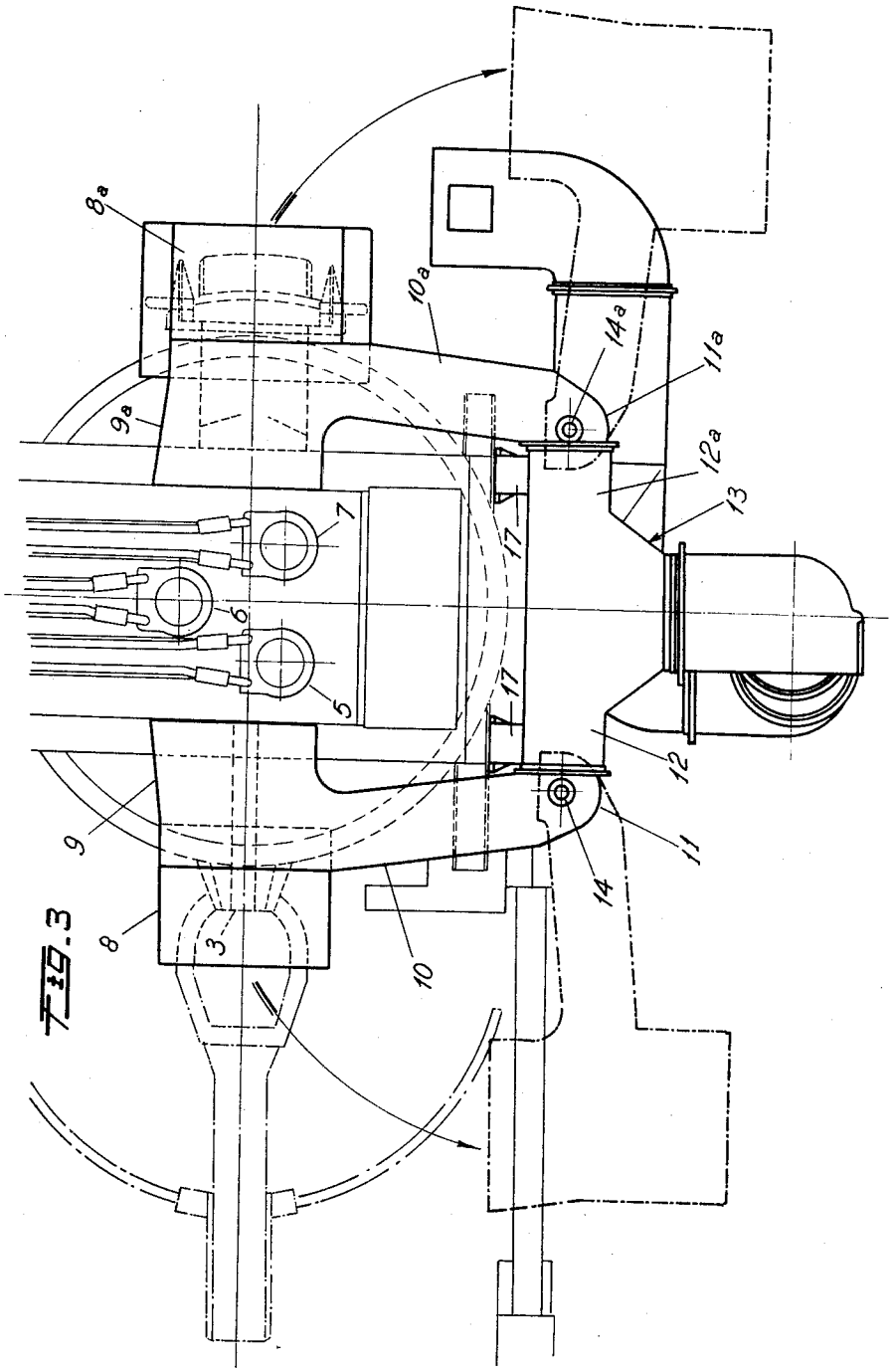


FIG. 3

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SMOKE SUCTION INSTALLATION FOR ELECTRIC METAL MELTING FURNACES

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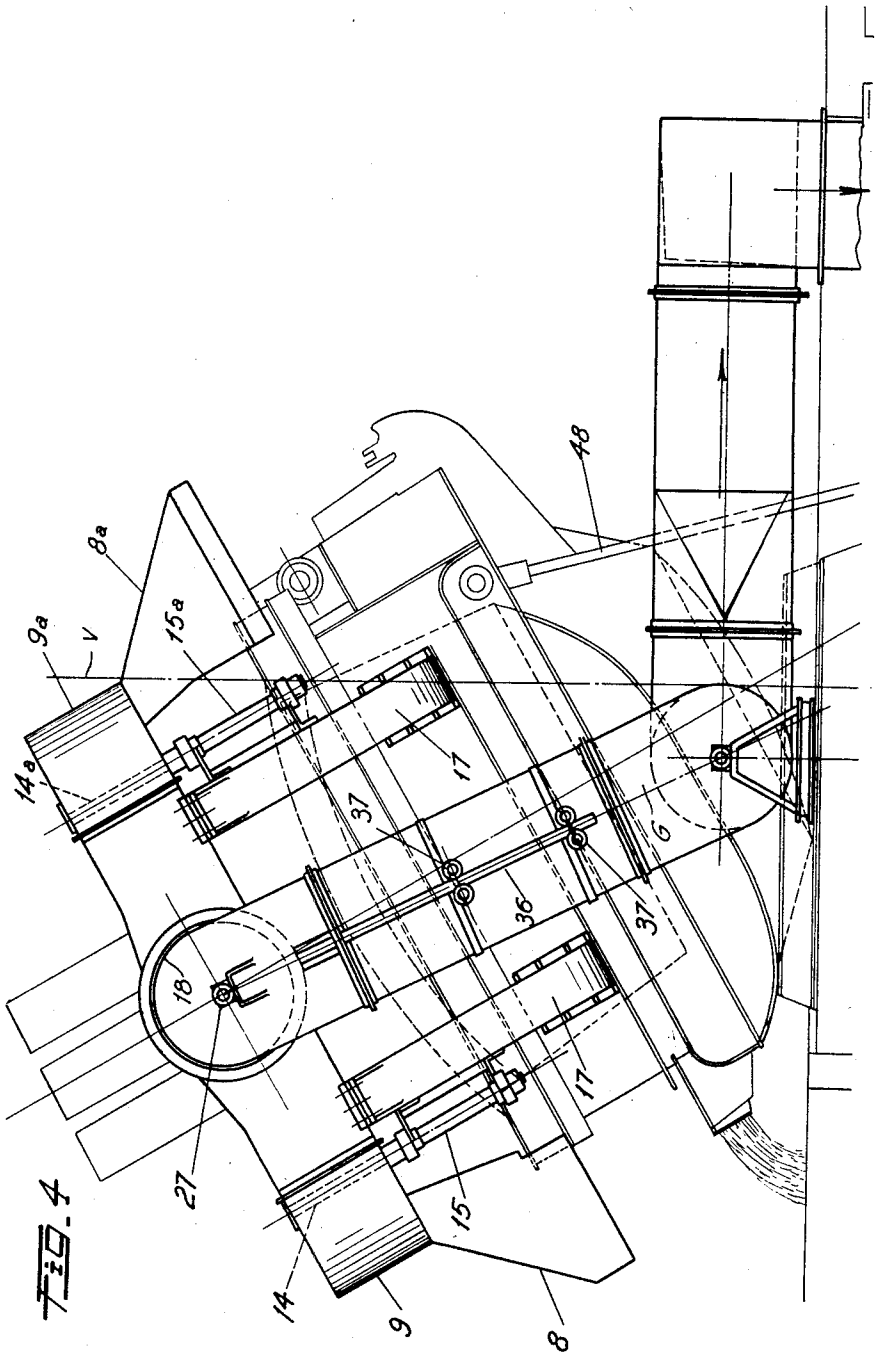


FIG. 4

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SMOKE SUCTION INSTALLATION FOR ELECTRIC METAL MELTING FURNACES

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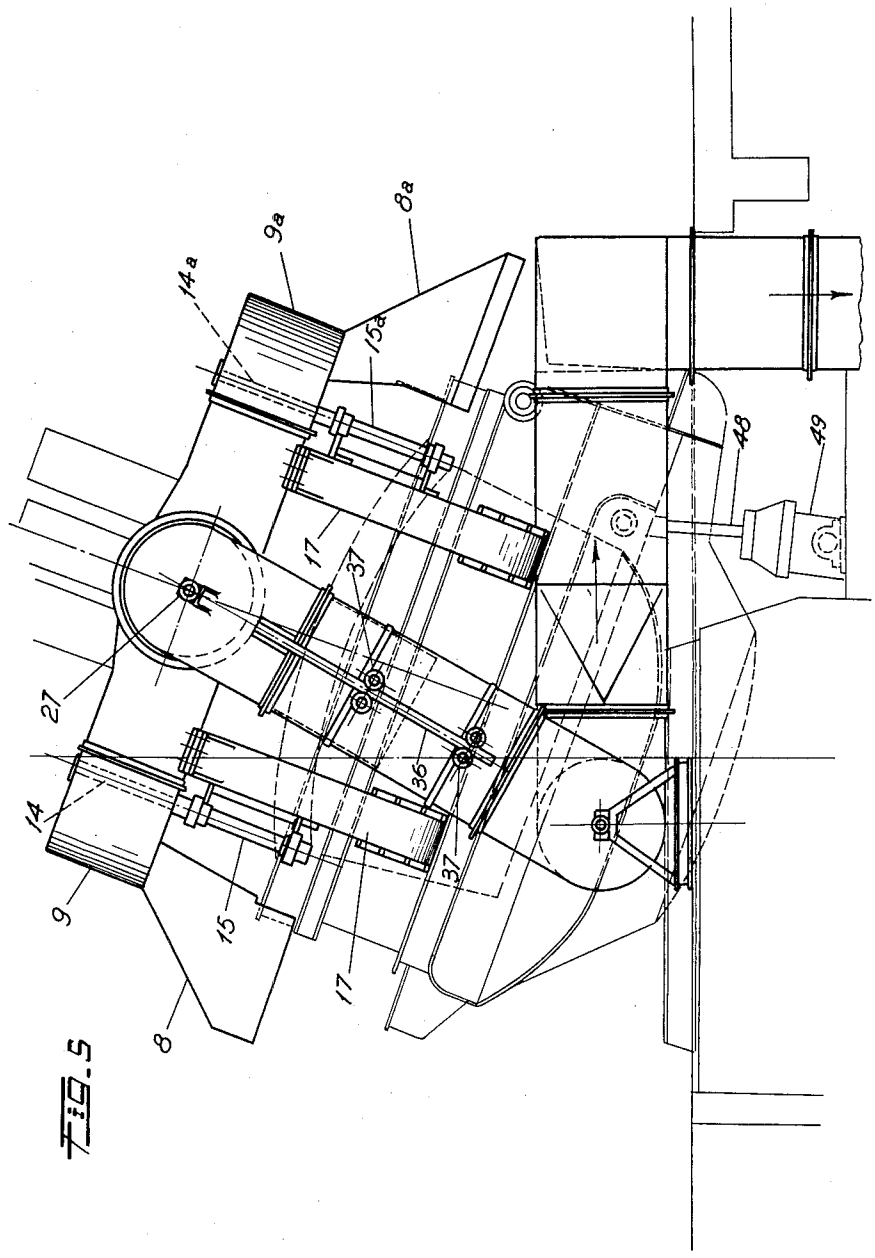


FIG. 5

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Patented Oct. 13, 1959

2,908,737

SMOKE SUCTION INSTALLATION FOR ELECTRIC METAL MELTING FURNACES

Giovanni de Dominicis, Milan, Italy

Application February 8, 1957, Serial No. 639,080

8 Claims. (Cl. 13—10)

The present invention relates to smoke exhaust installations and, more particularly to installations for electric metal melting furnaces.

With particular reference to the type of electric furnace having a crucible mounted to oscillate on supports and having a cover rotating on the vertical axis of the crucible in which two orifices are provided (one for the tapping of the furnace and the other for the discharge of slag), it is a known fact that the exhausting of fumes involves considerable difficulty.

In fact, since the fumes must be exhausted while the furnace is working and since, during operation, the crucible is caused to oscillate, many technical and functional difficulties have to be overcome.

For instance, in heretofore known installations, a cover may be provided with a suction duct by means of which the fumes are drawn off and, as long as the furnace has its geometrical axis in a vertical position the exhaust installation generally works fairly satisfactorily. This is, however, not a satisfactory arrangement when the furnace is tilted, because the suction piping, being rigidly fixed, cannot follow the motion of the cover. Furthermore, the connecting of such suction piping is not a simple matter.

It is an object of the invention to insure, under all circumstances, the perfect exhaust of fumes, and at the same time to provide an installation of simple construction. It is a further object of the invention to provide for exhaust while allowing the associated furnace to move freely in the tapping and slag discharge phases, and while also permitting a ready maintenance of the furnace itself.

These and other objects of the invention are achieved by an installation which is essentially characterized by the fact that, on each side of the furnace in correspondence with the tapping spout and the slag discharging orifice, and also in correspondence with the electrodes, an exhaust hood and orifice are provided. The fumes are drawn through respective ducts connected to an exhaust manifold, so designed as to follow the motions of the furnace during the phases of tapping and slag discharge, but remaining constantly connected to the aforesaid hood and orifice, the manifold being in turn connected to a vacuum inducing fan or the like.

In order to permit maintenance work on separate furnaces without hindrance to the various operations by the exhaust installation, the duct of each pair of installations, consisting of a hood and orifice, is swivel mounted and connected to a header acting as a fumes collecting chest, from which collecting and discharge ducts branch out so as to leave the furnace free and to permit rotation for the loading phase and to allow access to the furnace for maintenance work.

Due to the oscillation of the furnace with respect to the sides on which the tapping spout and the slag discharging orifice are located, a variation of distance with reference to the fixed parts takes place, and therefore the collecting duct is telescopic so as to be able to adapt automatically to the axial variations which take place

along the duct itself and to allow free movement of the furnace in its cradle.

In accordance with one embodiment of the invention, each hood and its corresponding suction orifice are made intercommunicating through a conduit. The free end of which is mounted, for oscillation in a horizontal plane with respect to the geometrical axis of the furnace, on a corresponding end of the collecting header firmly fixed to the outer shell of the crucible and having the possibility of rotating about a horizontal axis and therefore in a vertical plane in correspondence to its connection orifice with the telescopic collecting conduit. This latter conduit in turn is so designed as to be able to rotate about the lower connecting fitting with the piping abutting the fan.

The collecting conduit is advantageously formed by two end elbow fittings, each of which at one end have a flange, while the opposite end is connected to two lengths of a conduit inserted one inside the other in a telescopic fashion, the portions of conduit connected with the elbow fittings being mounted so as to swivel about associated swivel pins mounted on suitable supports, the latter being respectively integral with the crucible and to the collecting manifold connected with the fan.

The invention will next be more fully described with reference to the accompanying drawings wherein:

Fig. 1 is a diagrammatic view in elevation of an electric furnace with an exhaust installation according to the invention;

Fig. 2 is a view taken along line 2—2 in Fig. 1 and shows the furnace in its normal position;

Fig. 3 is a top plan view of the structure shown in Fig. 2;

Fig. 4 shows the furnace position during the tapping phase;

Fig. 5 shows the furnace position during the slag discharging phase;

In Fig. 6 is shown an enlarged cross section along line 6—6 in Fig. 2;

Fig. 7 shows a cross section of the collection manifold in Fig. 6; and

Fig. 8 shows the cross section of the flange of the collection manifold, taken along line 8—8 of Fig. 6.

In Figs. 1 and 2, a pivotable crucible *a* having a cupola *b* is mounted so as to oscillate by means of two curved slides **1** which are integral with the crucible and which run on the corresponding slideways **2**, these means being conventional.

The furnace is equipped with a spout **3** for tapping and with an orifice **4** for slag discharge, as well as with electrodes **5**, **6** and **7** (Fig. 3), all of these parts also being conventional.

In order to exhaust the fumes produced by the furnace and in correspondence with the tapping spout **3** and the slag discharge orifice **4**, exhaust hoods **8** and **8***a* and orifices **9** and **9***a* are provided on opposite sides of the electrodes **5**, **6** and **7**. These elements are so positioned because the fumes usually originate in proximity to the electrodes. The elements **8** and **9** and **8***a* and **9***a* lead, respectively, into a conduit **10** or **10***a*, the ends **11** and **11***a* of which lead in turn into the branches **12** and **12***a* of a collecting head **13**.

The conduits **10** and **10***a* are hinged at their ends **11** and **11***a* on pins **14** and **14***a* (Figs. 1, 2 and 3), and the branches **10** and **10***a* are supported by uprights **15** and **15***a* in brackets **16** and **16***a*.

The collector **13** is supported by two members **17** integral with crucible *a*.

The collector **13** is connected to an elbow **18** in such a manner as to render them mutually free to turn about the geometrical axis *x*—*x* of the axle **19** (Fig. 6) which acts as a support, the collector **13** being fitted with an annular flange **20** in which a corresponding flange **21** on

elbow **18** is free to rotate. This permits relative movement of the whole furnace with regard to the elbow **18**, the axle **19** being fixed at one end **22** in a boss **23** in the collection header **13** and at its middle part **24** by bearings **25** and **26** supported by spokes **25***a* and **26***a* on head **13** and elbow **18**, while the other end **22***a* is free to turn on support **27** which is integral with the elbow **18**.

The end **18***a* of the elbow **18** terminates at **28***a* from which extends a vertical branch **28** inserted telescopically in piping **29** fixed firmly to another elbow **30**.

This elbow **30** is at the same time engaged by an annular flange **31** with a corresponding internal flange **32** of piping **33**, the branch **34** of which is connected through its end **35** to a fan (not shown in the drawing).

To guide the two sections **28** and **29** for mutual sliding (Figs. 3 and 4), guides consisting of a pair of rods **36** are provided. These rods are secured to the elbow **18** and are free to slide between pairs of rollers **37** fixed to the section **29** (see also Fig. 7).

A supporting pin or axle **38** is provided for the elbows **30** and **34** in which are mounted sleeves **39**, **40**, **41** and **42** which position the supporting pin **38**, the sleeves **39**, **40**, **41** and **42** being supported in turn by members including spokes **40***a* and **41***a* (Figs. 6 and 8) on members **30** and **34**. The pin **38** turns in bearings **45** and **46** on a base **47**.

In operation, the furnace, having been charged and the metal melted, is tilted by means of the rod **48** (Fig. 2) actuated by a hydraulic cylinder **49** and reaches the position shown in Fig. 4 for tapping.

During this phase, the collector dust, i.e. the assembly consisting of the two elbows **18** and **33** and the connecting lengths **28** and **29** of these latter, makes a partial rotation with respect to the vertical plane V, a constant connection between the pipes being assured due to the telescopic system of mounting.

Similarly, for passing on to the slag discharging operation (Fig. 5), the constant connection between the pipes is insured, and consequently a perfect efficiency of the installation results.

As may be best seen in Fig. 4, the geometric axis of symmetry G of the collecting duct is at an angle with reference to the vertical and is displaced towards the tapping side in order to obtain almost equal sliding motions of the telescopically mounted pipes **28** and **29**. In other words, when the furnace is caused to turn for the tapping phase and also when it is tilted the other way for the slag discharging operation, the movements of the tubes one inside the other is practically equal.

Although one embodiment of the present invention has been described, it is to be understood that in practice various other forms may be possible without departing from the scope of the invention.

What is claimed is:

1. An exhaust installation, for a furnace having a pivotable crucible with diametrically opposed tapping and slag discharge means, comprising exhaust hoods independent of and at opposite sides of the crucible for exhausting fumes therefrom, conduits coupled to said hoods for leading away the fumes, a collecting head for collecting the fumes from said conduits, means coupling the conduits to said head and permitting movement of the conduits relative to the head so that the hoods can be guidably displaced from the crucible to permit a pivoting thereof for tapping and slag discharge operations, and a further conduit coupled to said head for the exhaust of fumes therefrom and including telescopic tubular elements which adapt said further conduit for axial adjustments required by the tapping and slag discharge operations.

2. An exhaust installation, for a furnace having a pivotable crucible with diametrically opposed tapping and slag discharge means, comprising exhaust hoods independent of and at opposite sides of the crucible for exhausting fumes therefrom, conduits coupled to said hoods for leading away the fumes, a collecting head for collecting the fumes from said conduits, means coupling the conduits to said head and permitting movement of the conduits relative to the head so that the hoods can be guidably displaced from the crucible to permit a pivoting thereof for tapping and slag discharge operations, and an elbow coupled to said head for the exhaust of fumes therefrom, said elbow and head each including mutually engaged means enabling a rotation of said elbow on said head for facilitating the said operations.

3. An exhaust installation, for a furnace having a pivotable crucible with diametrically opposed tapping and slag discharge means, comprising exhaust hoods independent of and at opposite sides of the crucible for exhausting fumes therefrom, conduits coupled to said hoods for leading away the fumes, a collecting head for collecting the fumes from said conduits, means coupling the conduits to said head and permitting movement of the conduits relative to the head so that the hoods can be guidably displaced from the crucible to permit a pivoting thereof for tapping and slag discharge operations, and a conduit coupled at one end to said head for the exhaust of fumes therefrom, an elbow at the other end of the latter said conduit, and a support for supporting said elbow for rotation about an axis whereby said head and hoods can be pivoted with said crucible.

4. An installation as claimed in claim 1 comprising external guide means on said further conduit for the guiding of said telescopic elements.

5. An installation as claimed in claim 2 comprising a telescopic conduit coupled to said elbow, and a further elbow coupled to said telescopic conduit, said elbows defining spaced and parallel axes, exhaust means, and means coupling said elbows respectively to said head and said exhaust means for rotation on said axes.

6. An installation as claimed in claim 5 comprising axles in said elbows and extending respectively into said head and exhaust means, bearings for the axles and spokes supporting said bearings in said elbows, head and exhaust means.

7. An installation as claimed in claim 6 comprising flanges on said elbows and telescopic conduits for the engagement of the same and further flanges on said elbows, head and exhaust means for the rotatable engagement of the same.

8. An installation as claimed in claim 7 wherein said exhaust means comprises a fan and a conduit operatively associated therewith and coupled via said elbows and telescopic conduit to said head.

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