United States Patent

[11] **3,539,168**

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[33] **Germany**
[31] **M 71,444**

[54] **EQUIPMENT FOR FLUE GAS EXTRACTION IN CUTTING DEVICES, PARTICULARLY FOR CONTINUOUS CASTING INSTALLATIONS**
9 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **266/23,** 164/263
[51] **Int. Cl.** **B23k 7/10,** B22d 11/12
[50] **Field of Search** 266/15, 23K; 164/69, 263; 98/115

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ABSTRACT: Fume gas extraction equipment in cutting devices utilized in continuous casting installations for cutting the continuously cast workpiece into segments wherein the workpiece is movably supported on spaced support elements while the cutting device moves synchronously above it with the cutting operation taking place between a pair of the support elements, is characterized by shielding the space beneath the cutting operation —to collect the cutting slag —both laterally and at the frontal surfaces and providing an upper covering connected to the support device between the pair of support elements with a fixed exhaust passage or canal arranged at the collecting chamber.

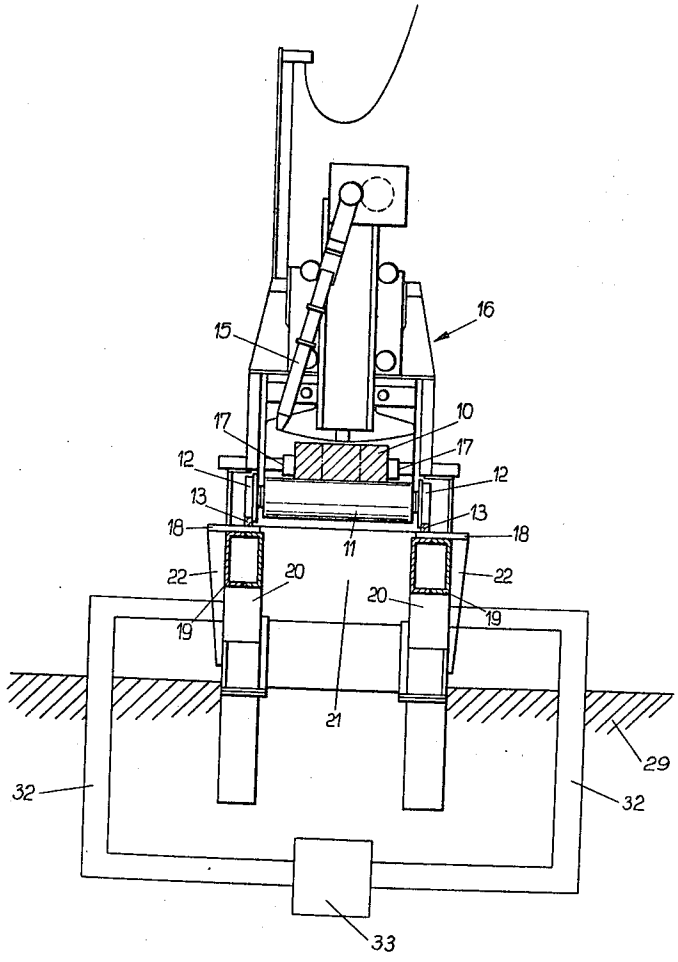


Fig. 1

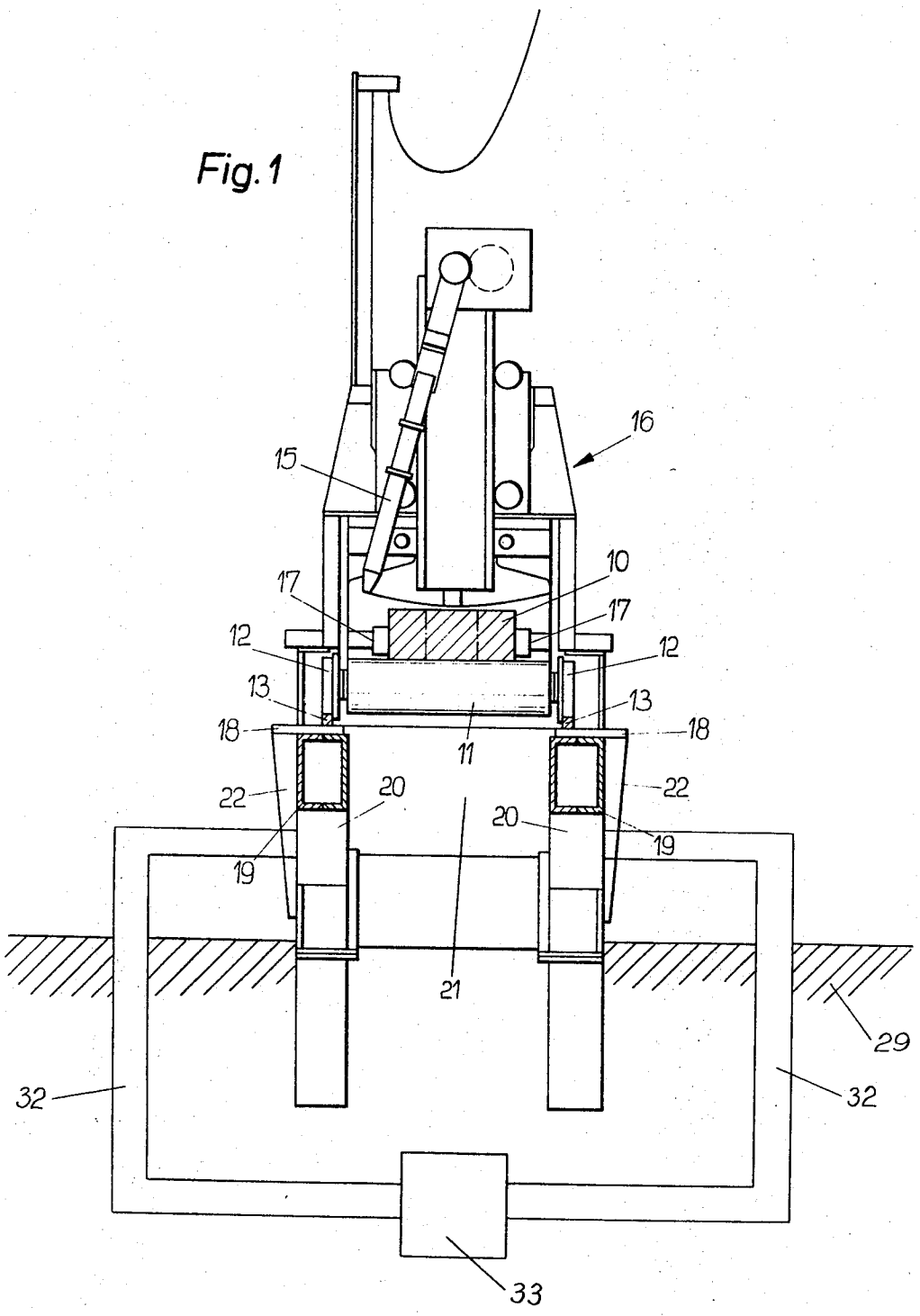


Fig. 2.

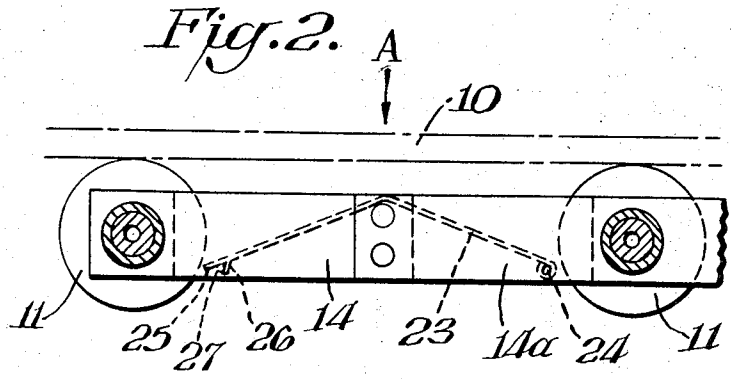

A
10
11
25
27
26
14
23
14a
24
11

Fig. 3.

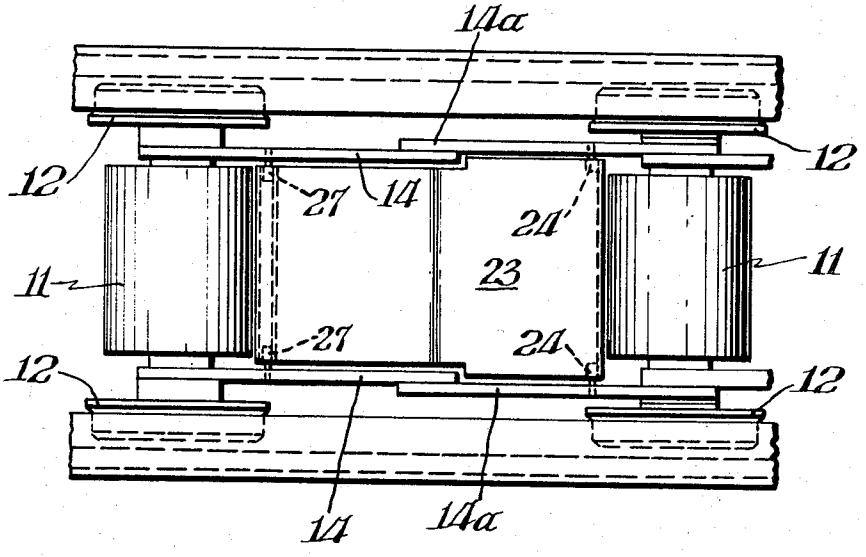

14a
12
12
27
14
24
11
23
11
27
24
12
12
14
14a

Fig. 4.

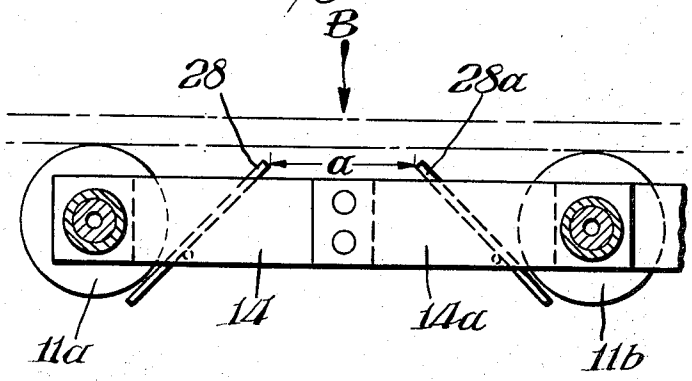
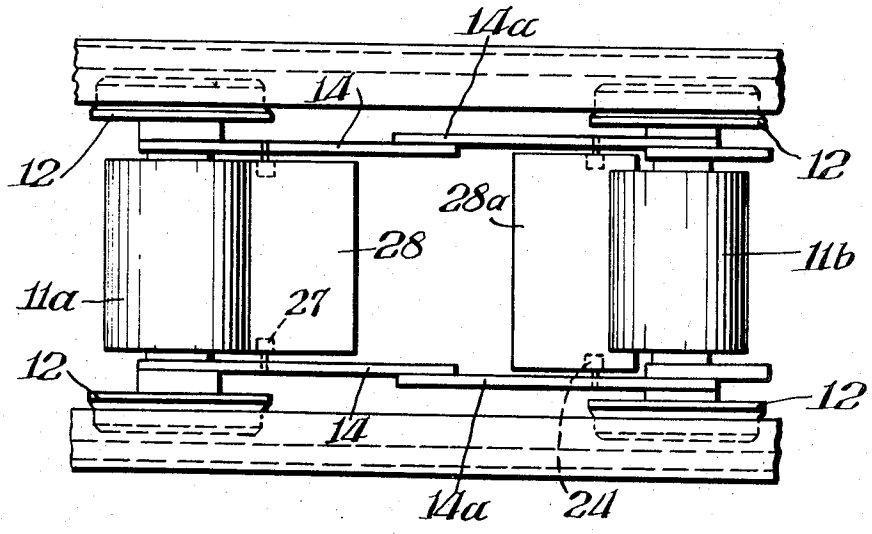

B
28
28a
a
14
14a
11a
11b

Fig. 5.


14a
14
12
12
28a
28
11b
11a
27
12
12
14
14a
24

EQUIPMENT FOR FLUE GAS EXTRACTION IN CUTTING DEVICES, PARTICULARLY FOR CONTINUOUS CASTING INSTALLATIONS

BACKGROUND OF INVENTION

The invention relates to equipment for flue gas extraction in cutting devices, particularly for continuous casting installations, for the separation of a continuously moving workpiece, where the cutting torch is moved in the direction of movement of the workpiece synchronously with the same and the workpiece is supported during the cutting process by a supporting device, preferably also moving synchronously with the same, the supporting device consisting of a plurality of spaced supporting elements and whereby the movement range of the cutting torch relative to the workpiece extends between two of these supporting elements.

In employing the thermochemical process for the separation of continuous casting on steel or steel alloys fumes result under the effect of the oxygen cutting stream. These fumes are characterized by a brown coloration and are particularly intense in cutting alloyed steel. For reasons of purification of the working atmosphere and of protection of the mechanical equipment prior to welding, the fumes must be captivated and drawn off. One solution to this problem has resulted in drawing off the less infiltrated air with the fumes.

The bent continuous workpiece, which moves horizontally in modern continuous casting installations, is supported in the area of the separation cutting equipment usually by a roll table or roller chain. The latter solution is especially preferred for billets, ingots and small iron slabs.

According to the width of the cast workpiece, the roller chain is more or less covered. For catching the fumes forming directly in the vicinity of the cutting torch, the following solutions have been known until now:

Suction funnels, for example, were arranged above the cutting machine. The coconduction of movable hoses encounters considerable constructive difficulties in this area and is very expensive.

As a further solution it is known to suspend a funnel in the roller chain in such a manner that the cutting torches beam their exhaust gases into the funnel orifice. At the same time this funnel serves for the drawing off of the resulting cutting slag. The funnel was provided with a lateral exhaust pipe and a hose or a slot guide was also arranged in an exhaust canal. Even this solution has proved to be very expensive.

SUMMARY OF INVENTION

The object of this invention is to eliminate the above disadvantages.

To solve this problem, the space for the collection of the cutting slag situated underneath the support device is screened laterally in the base area and at the frontal surfaces and the upper covering devices connected with the supporting device are arranged between the neighboring supporting elements of the supporting device—exclusive of the movement range of the cutting torch—with a fixed exhaust canal being arranged at the collecting chamber.

By the lateral screening of the collecting chamber which extends underneath the supporting device, for example by retracting corresponding walls, a collecting chamber for slag and fumes is formed underneath the passageway of the cutting machine and extending over its entire length from which the slag can be removed by lateral openings or by suitable conveying means. By the inventive covering devices, the intake cross section for infiltrated air is considerably decreased and thus the concentration of the fume particles is intensely increased in the drawn off exhaust gas.

The attached plates extend suitably over the entire movement range of the cutting machine or the support device, so that in each position of the latter, an almost complete covering of the top side is achieved against the fume collection chamber under the support device. The fumes are drawn off from the collection chamber at a suitable point by the novel, rigidly arranged canal.

The special value of the invention is particularly shown when, in the interests of air purification, a dust arrester must be connected. It can then draw off a highly concentrated fume gas whose dust removal is much more easily effected than that of a less concentrated one.

In several cutting installations arranged side by side as is customary, for example, for multiple continuous casting installations with several continuous cast workpieces proceeding parallel to each other, it is not required of course laterally to screen off separately each individual collecting chamber under each workpiece. Furthermore, a single shielding enclosing the entire installation suffices advantageously.

In order to afford an easy access of the laterally shielded collecting chamber, it is proposed in an advantageous further development of the invention, that the covering devices be detachably connected with the supporting device.

In view of the arrangement and construction of the covering device, which can take place basically at random in the scope of the above inventive idea, it is proposed for reasons of a simple operation as well as easy and cheap fabrication, that at the covering device, there be a plate which is provided with forklike ends directed downwards which overlap the pins of the like connected with the supporting device.

The stabilization of the plates in the movement direction of the workpiece takes place by means of the forklike plate ends or bifurcations, while the plates are held in a vertical direction by their own weight. Basically it is sufficient if only one plate end is constructed in a forklike manner.

The lateral stabilization of the upper covering device is feasible in varied ways. In the case where a chain with rollers as supporting elements serves as the supporting device with the rollers being connected by two parallel shackles or links, it is suitable that the covering device be arranged between the parallel shackles. If a movable support carriage serves as the supporting device, a corresponding solution is possible. If the supporting device consists of a stationary roller, lowerable in the cutting range, it is recommended to construct the covering device to be also lowerable or to be laterally swingable out of the way.

The plates serving as the covering device can basically be constructed as desired, for example to be level. Preferably it is proposed, however, that the plates be tilted upwards in roof-fashion. Thereby their stiffness is increased. Furthermore, the slants advantageously serve for the conveying off the cinders falling from the workpiece. In addition, during heating, for example by the red-hot workpiece, no downward buckling of the plates is possible.

In case the spacing of both of the workpiece support rollers arranged at both sides of the cutting area exceeds considerably the extent of the cutting area, it is suitable that the movement range of the cutting torch is limited by a plate on both sides and that the two plates form an angle opening downwards.

Advantageously the eventual possibility of drawing in infiltrated air is thereby limited to a minimum even for the movement range of the cutting torch open upwards per se.

THE DRAWINGS

FIG. 1 shows a continuous casting cutting equipment in cross section;

FIG. 2 shows a view of a portion of a roller chain for the support of the workpiece;

FIG. 3 shows a top view in the direction of arrow A according to FIG. 2;

FIG. 4 shows a view of another portion of the roller for the support of the workpiece; and

FIG. 5 shows the top view in the direction of arrow B according to FIG. 4.

DETAILED DESCRIPTION

As seen from the drawing, rollers 11 which represent component parts of a roller chain serve for the support of the workpiece 10 in the cutting area. Rollers 11 have wheels 12 at

the sides which are conveyable on guiding rails **13**. The individual rollers **11** are connected by shackles or links **14**, **14***a* as is particularly obvious from FIGS. **2—5**. Links **14** can be made continuous from one piece or they can be composed of two parts. The latter version is illustrated in FIGS. **2** and **3**.

As shown in FIG. **1**, on the shackles or links **14** of the roller chain a cutting device **16** is attached having a swingable cutting torch **15**. The cutting installation and thus also the roller chain are clampable to the workpiece **10** by means of a pressure medium activated clamping device **17**, so that the movement of the cutting installation in the direction of the workpiece takes place synchronously with the workpiece and thus its separation during its continuous longitudinal movement is possible.

As is further shown in FIG. **1**, guiding rails **13** for wheels **12** of rollers **11** of the roller chain are supported on plates **18** which in turn are arranged on carriers **19**. Carriers **19** are firmly anchored in the foundation **29** of the installation by vertical supports **20**. The space **21** extending between carriers **19** and supports **20** below rollers **11** is shielded laterally and at the frontal surfaces by walls **22**.

The shielding of space **21** from above occurs by means of roof-shaped plates **23**, according to FIGS. **2** and **3**, which are arranged between two adjacent rollers **11**. One of these plates **23** is illustrated in FIGS. **2** and **3**. Roof-shaped plate **23** is swingably supported by its one end on a pin **24**. The other end of plate **23** is bifurcated and has two fork arms **25**, **26**, directed downwards, which are engaged with pin **27**. Pins **24**, **27** are attached to the shackles or links **14**, **14***a* of the roller chain.

A complete covering of the space between two rollers **11***a*, **11***b* of the roller chain may not take place in the operating range of the cutting torch **15**, since on the one hand the flue gases resulting during cutting must reach into the above-described, shielded space **21**, and on the other hand a continuous covering plate in the operating range of the cutting torch would become damaged immediately by the cutting flame. According to the invention, for this reason two single plates **28**, **28***a* arranged between the particular rollers **11***a*, **11***b* (FIGS. **4** and **5**) of the roller chain. The plates **28**, **28***a* thus expose the operating range of the cutting torch designated with *a*. Where the roller distance in the operating range of the cutting torch is sufficiently small, such plates can be omitted. The drawing off of the fume gases, advantageously concentrated by the all-round shielding of space **21**, from space **21** can take place at any desired spot of same, and suitably laterally. FIG. **1**, for example schematically illustrates the fume gases being drawn through pipes **32** into exhaustor **33**.

The embodiment disclosed in the text of the application and illustrated in the drawing serves for clarifying the invention, which need not be limited to this example. Furthermore, various modifications are possible without thereby departing from the scope of the invention.

I claim:

1. In equipment for fume gas extraction in cutting devices of continuous casting installations wherein the continuously cast workpiece is movably supported on a moving supporting device having spaced supporting elements and cutting means mounted for moving synchronously with and above the workpiece during the cutting operation to cut the workpiece into segments with the cutting operation taking place between a particular pair of the supporting elements, characterized in that a fume collecting space is disposed under said supporting device, said space being defined by shielding means at the sides and the ends and bottom thereof, said space communicating with said supporting device, to collect the slag under said workpiece supporting device, upper covering means connected to said supporting device between adjacent supporting elements other than said particular pair of supporting elements disposed in the movement range of said cutting device, and exhaust means communicating with said space and leading therefrom.

2. In equipment as set forth in claim **1** wherein said covering means is detachably connected to said supporting device.

3. In equipment as set forth in claim **2** wherein said covering means is a plate having a downwardly directed forklike end, pin means being on said supporting device, and said forklike end straddling said pin means.

4. In equipment as set forth in claim **3** wherein pivot pin means is secured to said supporting device, and the other end of said plate being pivotally connected to said pivot pin means.

5. In equipment as set forth in claim **1** wherein said supporting device is a roller chain with the rollers connected to each other by parallel links, and said covering means being disposed between said parallel links.

6. In equipment as set forth in claim **5** wherein said covering means includes upwardly tilted roof-shaped plate means.

7. In equipment as set forth in claim **1** including further covering means disposed between said particular pair of supporting elements in said movement range.

8. In equipment as set forth in claim **7** wherein said further covering means includes a pair of angularly directed plates spaced from each other at their upper ends a distance equal to the range of movement of the cutting device to limit the movement of the cutting device.

9. In equipment as set forth in claim **7** wherein said covering means includes a plate having a forklike end, pin means being on said supporting device, said forklike end straddling said pin means, pivot pin means being on said supporting device, and the other end of said plate being pivotally connected to said pivot pin means.