United States Patent [19]

Enkner

[11] **3,827,583**

[45] **Aug. 6, 1974**

[54] **SCRAP CHARGING MACHINE FOR CONVERTERS**

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[73] Assignee: **Vereinigte Osterreichische Eisen-und Stahlwerke Aktiengesellschaft,** Linz, Austria

[22] Filed: **Dec. 29, 1972**

[21] Appl. No.: **319,524**

[30] **Foreign Application Priority Data**

Jan. 11, 1972 Austria 179/72

[52] **U.S. Cl.**..... **214/18 SC,** 105/269, 214/313

[51] **Int. Cl.**..... **F27b 3/18**

[58] **Field of Search**..... 214/18, 18 SC, 35 R, 313; 105/269

[56] **References Cited**

UNITED STATES PATENTS

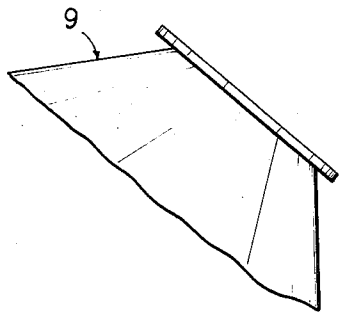
3,146,901	9/1964	McDowell et al.	214/18 SC
3,214,035	10/1965	Krause et al.	214/18 SC

Primary Examiner—Robert G. Sheridan
Attorney, Agent, or Firm—Brumbaugh, Graves, Donohue & Raymond

[57] **ABSTRACT**

A scrap charging machine for converters is provided with which the ideal movements of crane charging are imitated and which is adaptable to local conditions. It comprises on a bogie chutes and chute carriers, and a crank mechanism for lifting and tilting the chutes. The chute carriers include a fork-shaped part which receives the chute and is movable on wheels on the bogie so as to form a chute carrier vehicle, and tilting levers hinged to the fork-shaped part and the bogie. The machine further comprises push rods hinged to the bogie and the tilting levers, and a stop between the fork-shaped part and the tilting levers. Upon actuation of the push rods the chute carrier vehicle is moved in a straight line in horizontal direction until the stop is reached, whereupon it is lifted into charging position and tilted.

1 Claim, 7 Drawing Figures



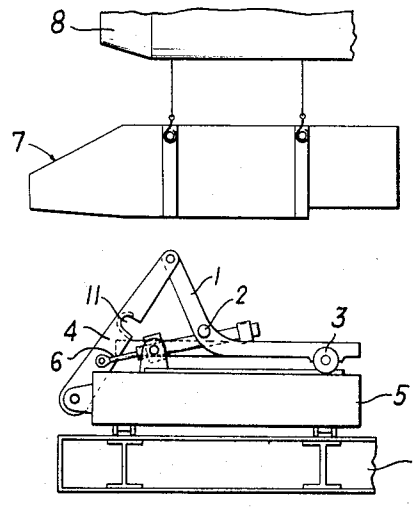


FIG. 1

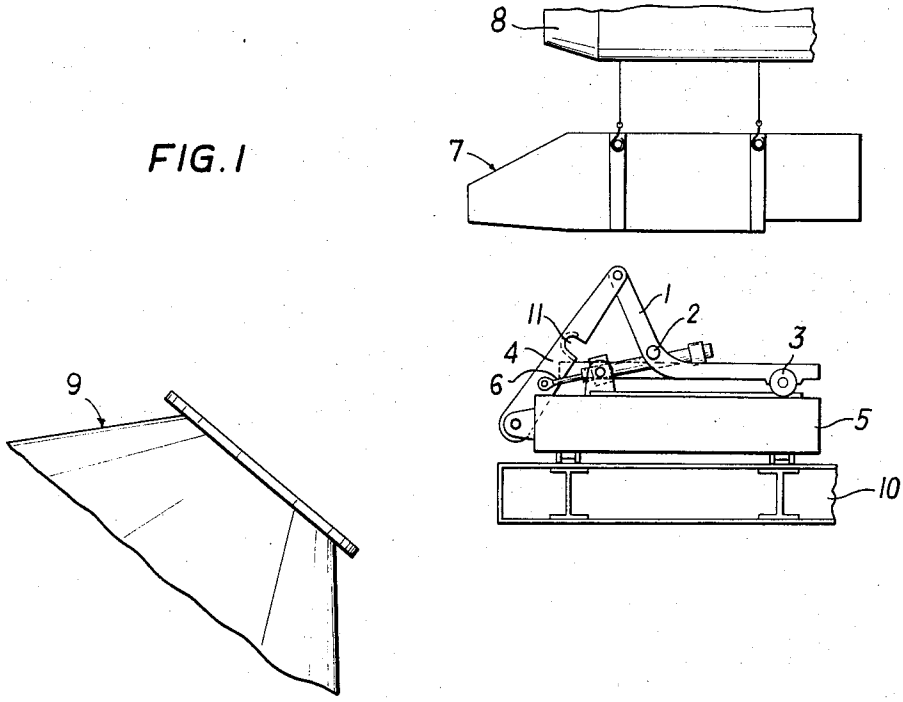


FIG. 2

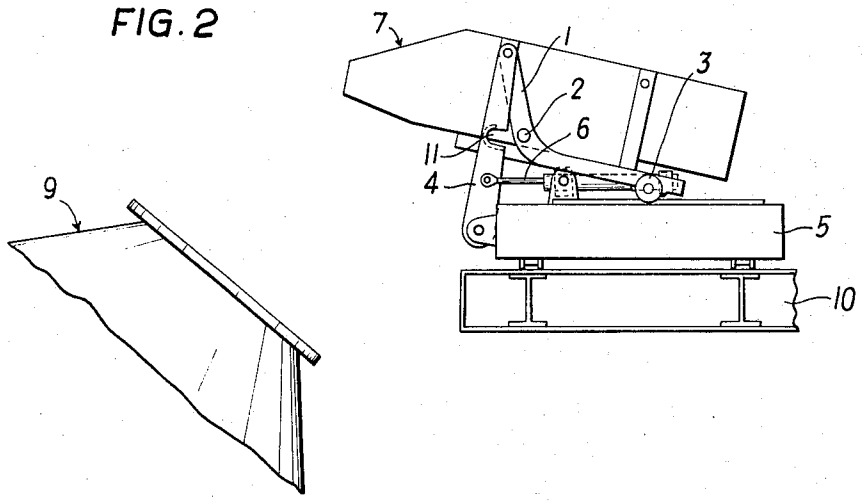


FIG. 3

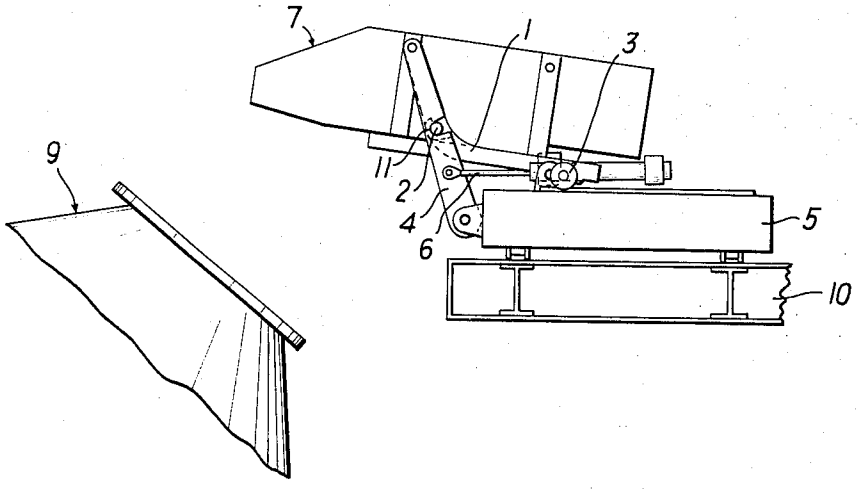


FIG. 4

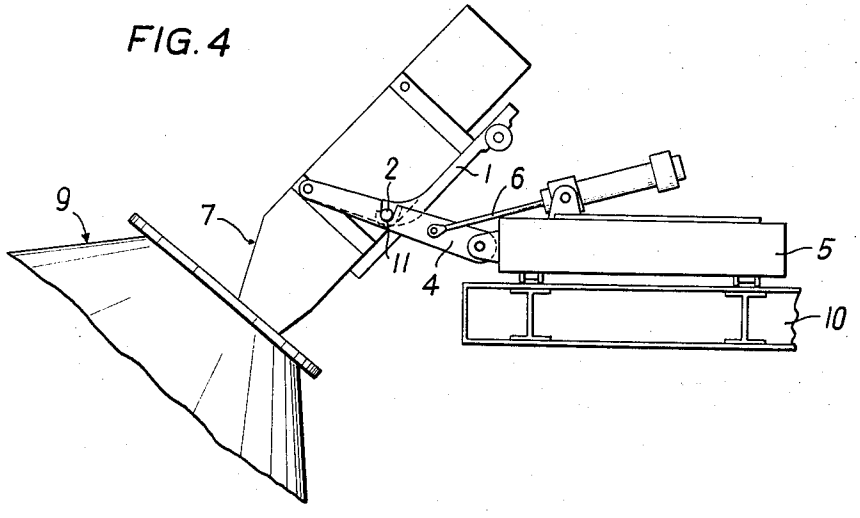


FIG. 5

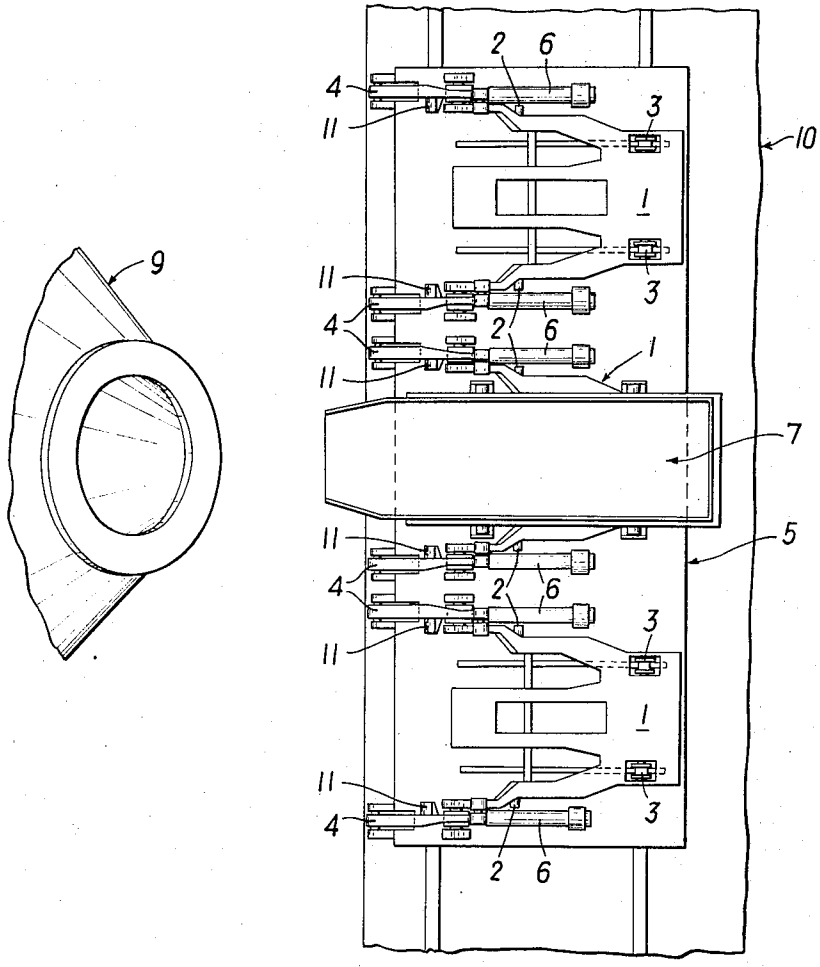


FIG. 6

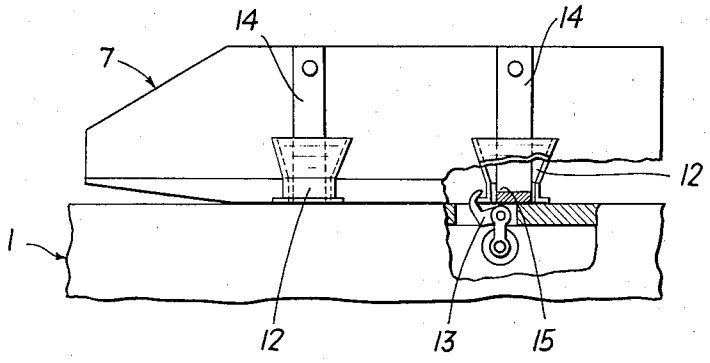
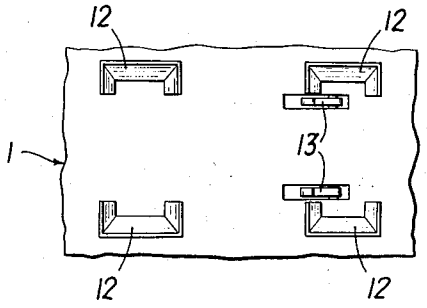


FIG. 7



SCRAP CHARGING MACHINE FOR CONVERTERS

The invention relates to a scrap charging machine for converters comprising a plurality of chutes supported on chute carriers, the chute carriers being arranged on a bogie which is movable preferably vertically to the tilting plane of the converters, and a crank mechanism for lifting and tilting the chutes.

There are still some problems in charging converters with scrap although numerous construction proposals have been made in this field. In one of the most frequently applied methods specific charging cranes are used to bring the scrap chutes to the converter mouth in a position in which it is impossible that the scrap falls out too early and then they are tilted. In this manner it is avoided that pieces of scrap fall beside the converter. Often, however, owing to the restricted space available there is no room for charging cranes in the steel works or else the operational time schedule is delayed too much by the use of cranes. Therefore scrap charging machines were developed which may be adapted to local conditions.

According to a known proposal (Austrian Patent No. 240,394) a scrap charging machine comprises a bogie movable on the platform, on which bogie tiltable big chutes are deposed. In the charging process the scrap is supplied into the converter mouth by gravity via a curved discharge groove.

Also in the German patent No. 1,458,807 a charging machine with tiltable chutes is described. This machine has the disadvantage, however, that the opening of the chute is in about the same height as the converter mouth, which may easily cause damaging.

A further known charging means is described in the German patent No. 1,186,480: a scrap carrier vehicle is guided to the converter on rails which are arcuated downwardly for its front wheels and arcuated upwardly for its hind wheels. In this arrangement it is a disadvantage that the vehicle is moving to the converter during the entire charging process, i.e., also during tilting, so that scrap which comes to slide too early may fall beside the converter. Also the rail paths have to reach until above the converter which fact necessitates greater structures and renders the plant complicated.

The invention is aimed at avoiding the described disadvantages and difficulties. It is an object of the invention to reduce the space requirements for the charging means and to render possible a tilting of the chute for which little height above the charging platform is needed. Further, the scrap charging machine should have an extremely wide lay out, the upper margin of the chute rear wall should have a small swing out height and the starting position of the chute should be low. The invention is aimed at imitating the movements of crane charging which are in themselves ideal without having to provide crane paths with cranes. Such imitation should be achieved with simple means.

It is a particular object of the invention to effect continuous charging, i.e., continuous supply of scrap chutes to the converter and their tilting, whereby after the scrap has started to slip at a specific angle of repose the movement of the scrap is directed owing to the continued chute movement. Thereby it should be possible to regulate the fall of the scrap in the converter so as to protect sensitive zones of the converter bricks.

In a scrap charging machine of the type described in the introduction this object is achieved according to

the invention in that each chute carrier comprises an open frame— or fork-shaped part receiving the chute and tilting levers hinged to said part, the frame-shaped part being movably guided by means of wheels on a bogie and the tilting levers being hinged to the bogie, and in that push rods whose length may be varied are hinged to the bogie on the one hand and to the tilting levers on the other hand, a stop being provided between the frame-shaped part and the tilting levers, so that when the push rods are actuated the chute carrier vehicle is at first moved in a straight line in horizontal direction until the stop is reached and then it is lifted into charging position for emptying the chute and tilted.

It is characteristic for the construction according to the invention that by using a single drive a rectilinear movement is combined with the lifting and tilting movement in a continuous course, whereby with but a modest construction on the platform, without feed rails to the converter and the like, great transport paths can be accomplished.

In order that the invention may be more fully understood, it shall now be explained with reference to the accompanying drawings. FIGS. **1** to **4** illustrated subsequent phases of the charging process. In FIG. **5** a ground plane of the charging machine is shown, FIGS. **6** and **7** are a lateral view and a top view, respectively, and show details of how the chute is secured to the chute carrier vehicle.

FIG. **1** illustrates the beginning of the charging process. Numeral **1** denotes a frame— or fork-shaped part of the chute carrier vehicle which is movably arranged by means of wheels **3** on the bogie or main vehicle **5.** The fork-shaped part **1** is hinged to the bogie **5** by means of two tilting levers **4.** Push rods **6,** whose length may be varied, preferably hydraulically actuated piston rods, are hinged to the tilting levers **4** on the one hand and with the bogie **5** on the other hand. When these pushrods are actuated, the fork-shaped part rolls on the bogie **5.**

A stop **2** designed as a tappet is arranged on the fork-shaped part **1.** It engages with a tappet recess **11** on the tilting levers when the fork-shaped part **1** of the chute carrier vehicle is moved in forward direction, i.e., towards the mouth of the converter **9.** The bogie **5** is movable on the charging platform **10.** On the bogie a plurality of chute carrier vehicles may be provided.

FIG. **1** illustrates the stage in which a chute **7** filled with scrap is deposed by a crane **8** onto the chute carrier vehicle.

FIG. **2** illustrates the following phase: by actuating the push rods **6** by means of the pressure cylinder the fork-shaped part **1** together with the chute deposed on it has rolled in forward direction until short of the engagement position of the tappet in the tappet recess **11.**

In FIG. **3** the period is illustrated in which the tappet is caught. From this position onward the tappet **2** blocks any further advance movement of the chute carrier vehicle. The own weight of the chute carrier vehicle guarantees a safe engagement of the tappet **2** in the recess **11.** When the push rods **6** are further actuated the fork-shaped part **1** of the chute carrier vehicle is lifted off; it moves in a circular movement around its rotation axis to the converter mouth until the opening of the chute **7** extends into the converter mouth **9.** In this position which is illustrated in FIG. **4** the angle of

repose is obtained; the scrap slides into the converter.

The ground plan according to FIG. **5** shows that three scrap carrier vehicles may be arranged on a bogie **5**. Two tilting levers **4** are coordinated to each fork-shaped part **1**, one on each side.

FIGS. **6** and **7** illustrate how the scrap charging box is secured to the chute carrier vehicles. For this purpose guiding plates **12** are provided on the chute carrier vehicles in which lateral reinforcement plates **14** of the chute **7** are maintained in correct position so as to guard them against undesired movements. On the chute carrier vehicle furthermore a lock **13** is provided which catches in a connecting link **15** provided in the rear lateral reinforcement plate **14**.

In the appended claims part **1** is referred to as frame-shaped part, but it is to be understood that such terminology is to include also parts having fork-shape or related shapes.

What I claim is:

1. A scrap charging machine for converters comprising a plurality of chutes, chute carriers for supporting said chutes, a movable bogie for supporting said chute carriers, a plurality of push rods, actuator means for actuating said push rods, and stop means, each chute carrier including frame-shaped means and a plurality of tilting levers, said frame-shaped means being adapted to receive a chute and having wheels to form a chute carrier vehicle movable on said bogie, and said tilting levers being hinged on the one hand to said frame-shaped means and on the other hand to said bogie, said push rods being connected to said actuator means and being hinged on the one hand to said bogie and on the other hand to said tilting levers, and said stop means being positioned between said frame-shaped means and said tilting levers, whereby when said push rods are actuated the chute carrier vehicle is first moved in a horizontal direction until the stop means is reached and thereafter lifted into charging position and tilted thereby emptying the contents of the chute into a converter.

* * * * *

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,827,583 Dated Aug. 6, 1974

Inventor(s) Bernhard Enkner

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

First page, Item [73], "Vereinigte Osterreichische Eisen-und Stahlwerke Aktiengesellschaft" should be --Vereinigte Österreichische Eisen- und Stahlwerke - Alpine Montan Aktiengesellschaft--.

Col. 2, line 24, "illustrated" should read --illustrate--; and

Col. 2, line 26, "plane" should read --plan--.

Signed and sealed this 26th day of November 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents