

March 25, 1969

SHUNZO ASAMURA  
APPARATUS FOR CARRYING A CONVERTER OR  
A CONTAINER SIMILAR THERETO

3,434,606

Filed Dec. 29, 1966

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FIG. 1

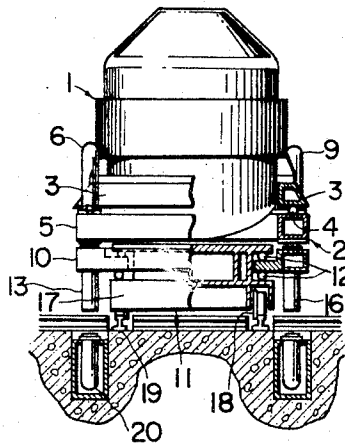


FIG. 2

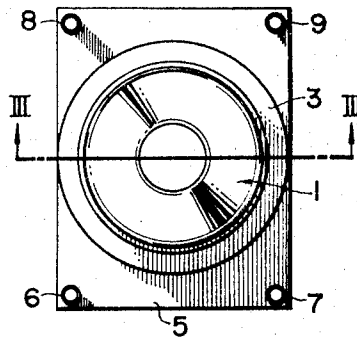
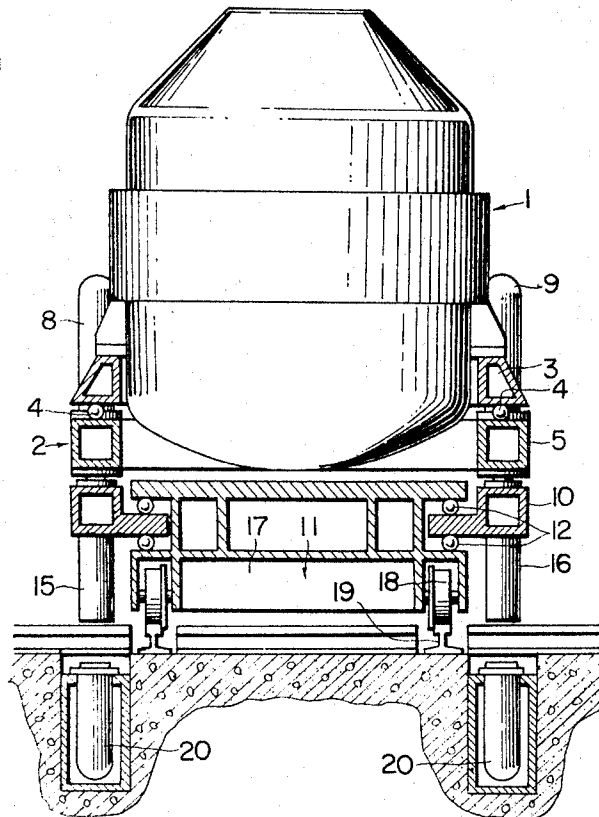


FIG. 3



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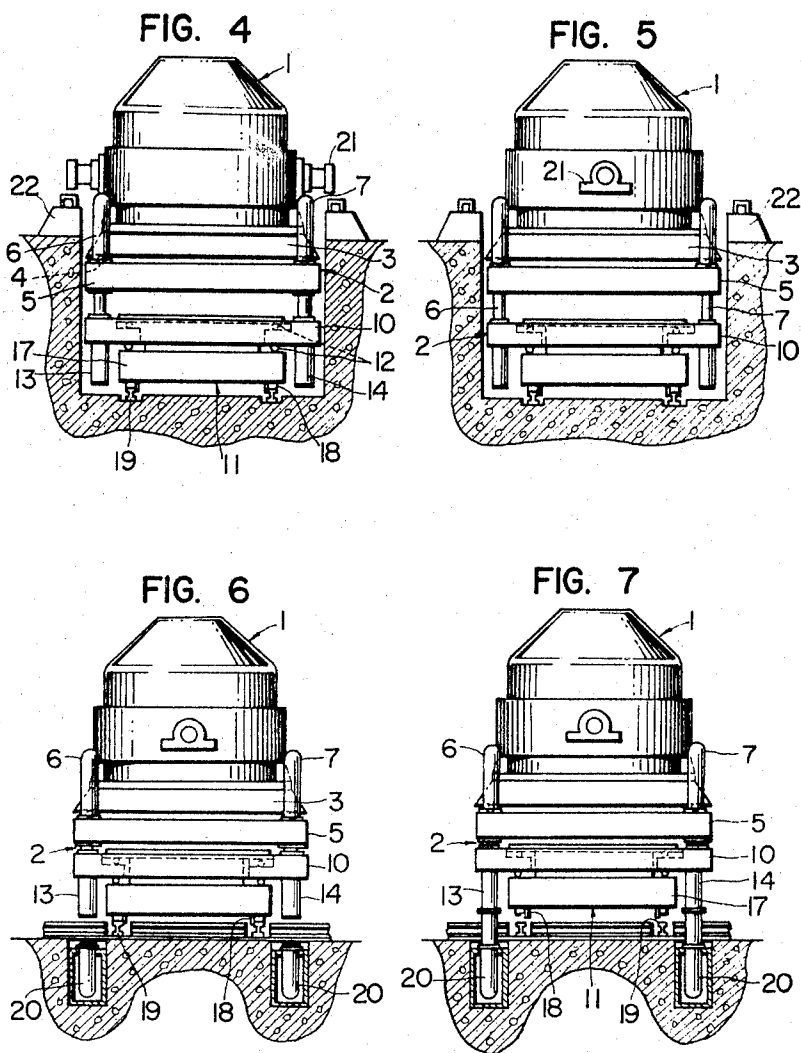
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FIG. 8

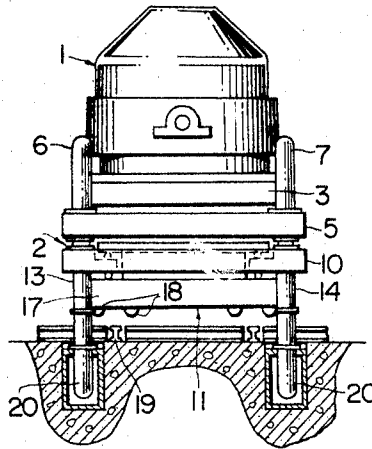


FIG. 9

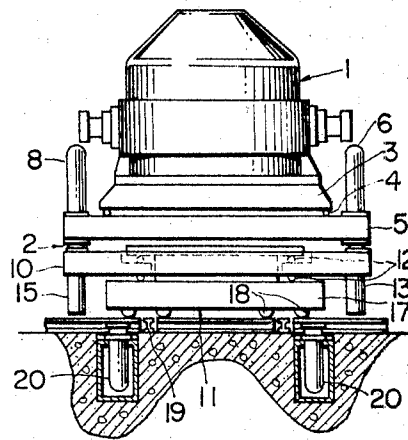
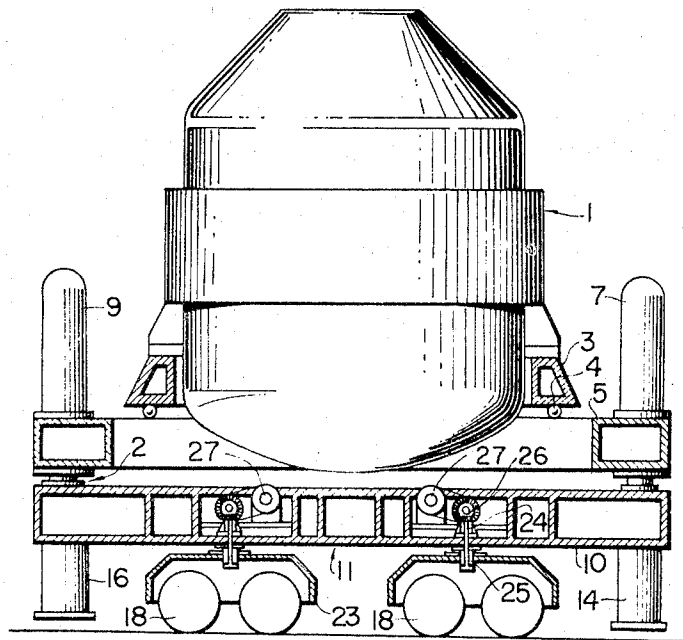


FIG. 10



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## APPARATUS FOR CARRYING A CONVERTER OR A CONTAINER SIMILAR THERETO

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5 Claims

### ABSTRACT OF THE DISCLOSURE

This invention relates to apparatus including means for pivotally carrying steel-making vessels, sometimes called converters, which require periodic servicing. The invention includes a converter mounted on a plurality of frames and a mobile truck or running mechanism which are relatively movable in a vertical plane relative to each other, with part of the frame, vessel and running mechanism being rotatable about a vertical axis for effecting change of direction so as to side-track the converter vessel for periodic service. The present device enables not only the truck's running gear to be rotated to become re-oriented with sidetracks headed in different directions than normally used when in normal steel-making operation, but also enables the complete converter frame with converter vessel to be rotated likewise. The apparatus embodies hydraulic lifting jacks interposed between its plural frames as well as at predetermined transfer stations in the factory layout.

The present invention relates to an apparatus for carrying such a container as a converter or a ladle.

A conventional truck used on a railway for carrying such a container as mentioned above is equipped with a ring-shaped frame for supporting a converter or the like. The supporting device is set on the truck so as to be vertically movable by means of a pressure apparatus. A disadvantage of the known prior art trucks is that they can be changed in their direction of travel only by means of a turntable installed on the railway. The converter operation in a typical steel works will be explained hereunder by way of example. Converters are arranged in a line. On a side of the converters thus arranged, there exist converter brick work stands, and also converter stand-by stands. The converters are each carried from the converter operating position to the brick work position for relining by new brick laying, and further to the converter stand-by position. Accordingly, the railway for the trucks must be furnished with intersections corresponding in number to the converters and the stands.

The above-mentioned prior truck requires a turntable to be set on each of the intersections so that the equipment is necessarily very complicated and greatly expensive.

An object of this invention is to provide a conveying apparatus which overcomes the above described disadvantage, and contemplates such an apparatus for carrying a converter or a container similar to the former that, while a truck remains on rails, the converter or the like mounted on the truck can be vertically moved and turned and that the container can be changed in direction by turning a running mechanism alone. Thus, the apparatus embodying the present invention not only makes it extremely easy to position the truck and the converter mounted on the truck but also enables the truck to undergo a change of direction without necessitating the provision of a turntable.

The features of this invention will be more fully understood from the following description taken in conjunction with the accompanying drawings in which:

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FIG. 1 is a front elevation view of a carrying apparatus embodying the present invention;

FIG. 2 is a plane view of the apparatus shown in FIG. 1;

FIG. 3 is a sectional view taken along the line 3—3 in FIG. 2 with some parts shown in elevation;

FIGS. 4, 5, 6, 7, 8 and 9 are elevation views which illustrate the operation of the carrying apparatus; and

FIG. 10 is a view partially in cross-section and partially in elevation similar to FIG. 3 which shows another embodiment of this invention.

As shown in FIGS. 1, 2 and 3, the present invention

provides an apparatus for carrying a converter or a container similar thereto which is characterized as follows:

A lower frame 10 is equipped with pressure devices 6, 7, 8 and 9, which serve for vertically moving an upper frame 5; a converter cradle 3 is mounted on the upper frame 5 so as to be horizontally rotatable in respect to the latter; the lower frame 10 is fitted with force receivers 13, 14, 15 and 16 which correspond to pressure lifters 20 installed at a position for changing the truck direction; a running mechanism 11 is fitted to the lower frame 10 so as to be horizontally rotatably with respect to the frame 10.

As embodiment of this invention will now be described in detail in connection with the drawings. A converter is taken as an example of the container to be carried. Referring to FIGS. 1, 2 and 3, the reference numeral 1 denotes the converter, the numeral 2 represents a truck body, and the numeral 19 stands for a pair of rails. The truck body 2 is composed in the following manner.

The pressure devices, for example, hydraulic cylinders 6, 7, 8 and 9 are fixed on the lower frame 10, and the upper frame 5 is fastened to the pressure devices. The ring-shaped converter cradle 3 is mounted on the upper frame 5 through a plurality of turning ball bearings 4 so as to be horizontally rotatable. Accordingly, the converter 1 rotates together with the converter cradle 3 and is made of move vertically along with the upper frame 5 and the cradle 3 by means of the pressure devices 6, 7, 8 and 9. The force receiver 13, 14, 15 and 16 are fixed to the lower frame 10, which is also equipped with the running mechanism 11. The mechanism 11 consists of a wheel frame 17 complete with a ball bearing stand and wheels 18 fitted to the wheel frame 17. The running mechanism 11 is fitted to the lower frame 10 through the turning ball bearings 12 so as to be horizontally rotatable relative to the frame 10. The force receivers 13, 14, 15 and 16 are so arranged as not to be in contact with the ground while the wheels 18 fitted to the wheel frame 17 are mounted on the rails 19 and as to meet the pressure lifters, for instance, hydraulic jacks 20 provided at a position where the advancing direction of the truck is to be changed.

The operation of the apparatus embodying the present invention which is constructed as described above will be introduced hereunder. FIG. 4 illustrates the truck 2 with the converter in its operating position. The truck 2 is set under the converter 1 mounted on bearing stands 22 through trunnion bearings 21. By raising the upper frame 5 by means of the pressure devices 6, 7, 8 and 9, the converter cradle 3 is lifted until brought into contact with the engaging portion of the converter 1. Then, the converter 1 is further raised by means of the pressure devices so that the converter 1 is disengaged from the bearing stands 22, and then the converter cradle 3 is turned. (Refer to FIG. 5.) Next, the pressure devices are operated to lower the upper frame 5 in order to bring down the center of gravity of the converter 1 for stability, and the truck 2 is moved in the desired direction and stopped at the spot where the truck 2 should change its running direction. The stopping position of the truck is

adjusted so as to locate the force receivers 13, 14, 15 and 16 just above the pressure lifters 20 positioned as mentioned before. (Refer to FIG. 6.) Then, the pressure lifters 20 are actuated to push up the force receivers 13, 14, 15 and 16 with the result that the wheels 18 are detached from the rails 19. (Refer to FIG. 7.) This allows only the running mechanism 11 to be horizontally rotated. After swiveling the running mechanism 11 through an angle suitable for the subsequent progress of the truck 2 (see FIG. 8), the pressure lifters 20 are operated to lower the truck 2 so that the wheels 18 ride on the rails in the intended direction. Further, the lower frame 10 is rotated. (Refer to FIG. 9.) This completes the direction change, and the truck 2 is ready for the succeeding advance.

Another embodiment of this invention is shown in FIG. 10. In this embodiment, the running mechanism 11 is formed by connecting rocker beams 23 furnished with wheels 18 to the lower frame 10 through shafts 24. A bevel gear 26 is firmly fitted to one end of the shaft 24. The other end of the shaft 24 is fastened, with a key or the like, to a bearer 25 which is fixed to the rocker beam 23. The bevel gear 26 is revolved by means of an electric motor 27, a transmission chain, or another adequate device, with the consequent turn of the shaft 24 and the rocker beam 23.

Such being the construction, it is possible after lifting the wheels 18 from the rails at a direction change position by raising the force receivers 13, 14, 15 and 16 by means of the pressure lifters 20, to revolve both motors 27 so that the rocker beam 23 will turn through the angle desired for the direction change.

The above-mentioned running mechanism which serves for changing the truck running direction should be construed as merely illustrative and non-limitative of the scope of the present invention.

As apparent from the foregoing description of the carrying apparatus embodying the present invention, while the wheels 18 ride on rails the converter 1 can be freely rotated and moved in the vertical direction, so that the position of the converter 1 can be easily shifted; thus it is possible to heighten the efficiency of such works as converter operation and brick laying. Moreover, since only the running mechanism can be turned at a direction change position by lifting the truck 2 above the rails, it is extremely easy to subject the truck 2 to a change in direction of movement without using a turntable. This will exhibit an exceptionally high effect in converter operation.

While the present invention has been described with particular reference to converter operation, it will be understood that the description should be taken as illustrative of the invention and not in the limiting sense and that the apparatus of the invention can be used also to carry any container similar to a converter, especially a very heavy container.

What I claim is:

1. Apparatus for carrying a converter container or similar vessel in a mobile manner in association with trackways some of which are disposed at various trans-

verse angles relative to others and constituting transfer points for the purpose of facilitating side tracking of said container for periodic servicing, comprising in combination:

- (a) a lower frame constituting a central level of the apparatus;
- (b) pressure operated means including means attached on said lower frame;
- (c) an upper frame superposed above said lower frame and attached to said pressure operated means of the lower frame, to be vertically raised and lowered relative thereto by said pressure operated means,
- (d) a converter cradle frame for supporting said converter vessel upon the upper frame,
- (e) means mounting said cradle frame for rotation about a vertical axis relative to the other frames,
- (f) running mechanism including support wheel frame means with wheels to engage the trackways, and including means to facilitate rotation of the running mechanism relative to the lower frame means; and
- (g) means for lifting said carrying apparatus above the trackways via the lower support frame including force receiver means depending from said lower frame, and pressure-operated lifting means arranged below the trackways at said predetermined transfer points and adapted to engage said force-receivers.

2. Apparatus as defined in claim 1 wherein the pressure operated means include selectively operable hydraulic cylinder and ram means.

3. Apparatus as defined in claim 1 wherein the lower frame, upper frame, cradle frame and running mechanism are mounted about a common vertical axis.

4. Apparatus as defined in claim 1 wherein the running mechanism is mounted upon said lower frame and includes bearing means interposed therebetween to facilitate rotation of the running mechanism about a vertical axis relative to said lower frame as well as to facilitate rotation of said lower frame and superposed upper frame structure relative to said running mechanism.

5. Apparatus as defined in claim 1 wherein the running mechanism includes a plurality of rocker beam-supported wheel assemblies, said assemblies including shafts connected rigidly with said rocker beams and rotatably depending from said support frame means, and means on said support frame and shafts to rotate said shafts of said wheel assemblies to rotate the latter in unison through a predetermined angle adaptable to match with the siding tracks of a transfer station.

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ROBERT G. SHERIDAN, *Primary Examiner*.

U.S. Cl. X.R.

105—177; 266—36; 214—512