

May 27, 1958

H. L. McFEATERS

2,836,309

SCRAP CAR

Filed Jan. 5, 1956

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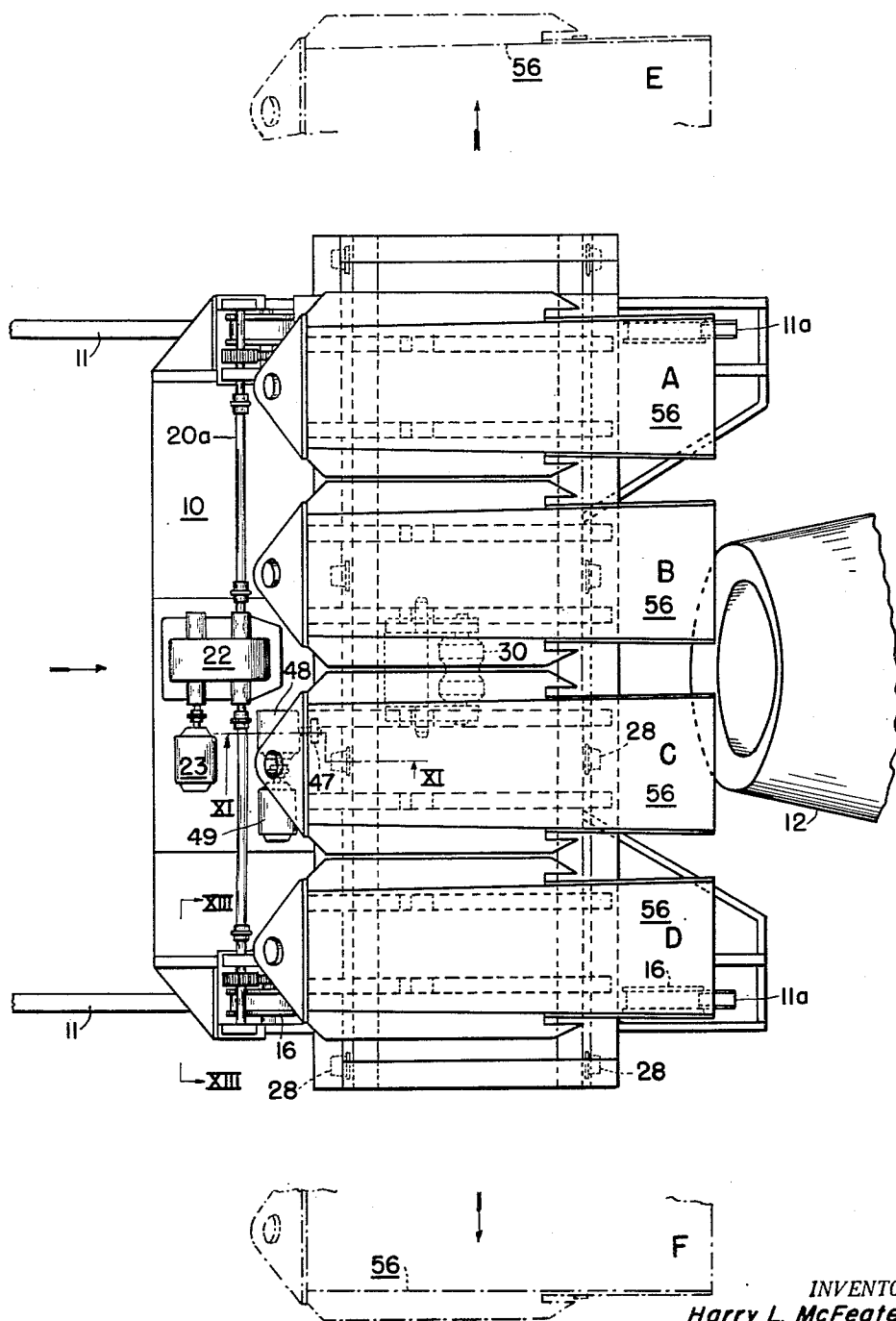


Fig. 1

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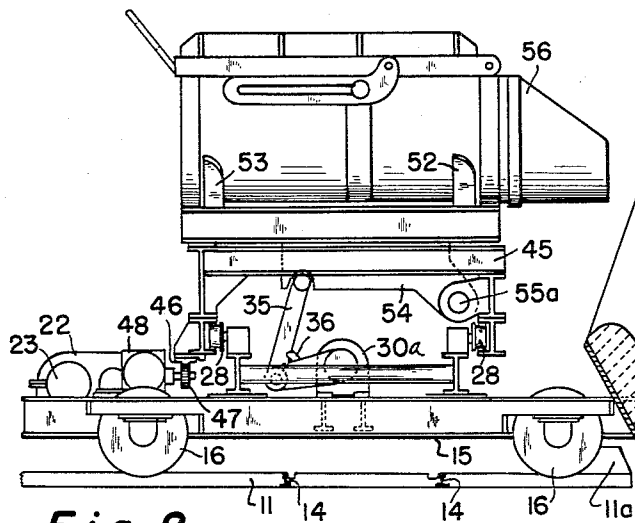


Fig. 2

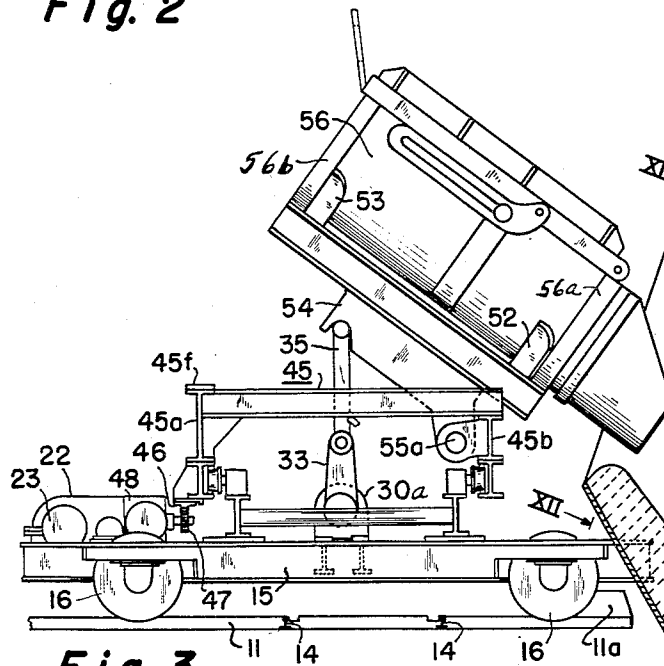


Fig. 3

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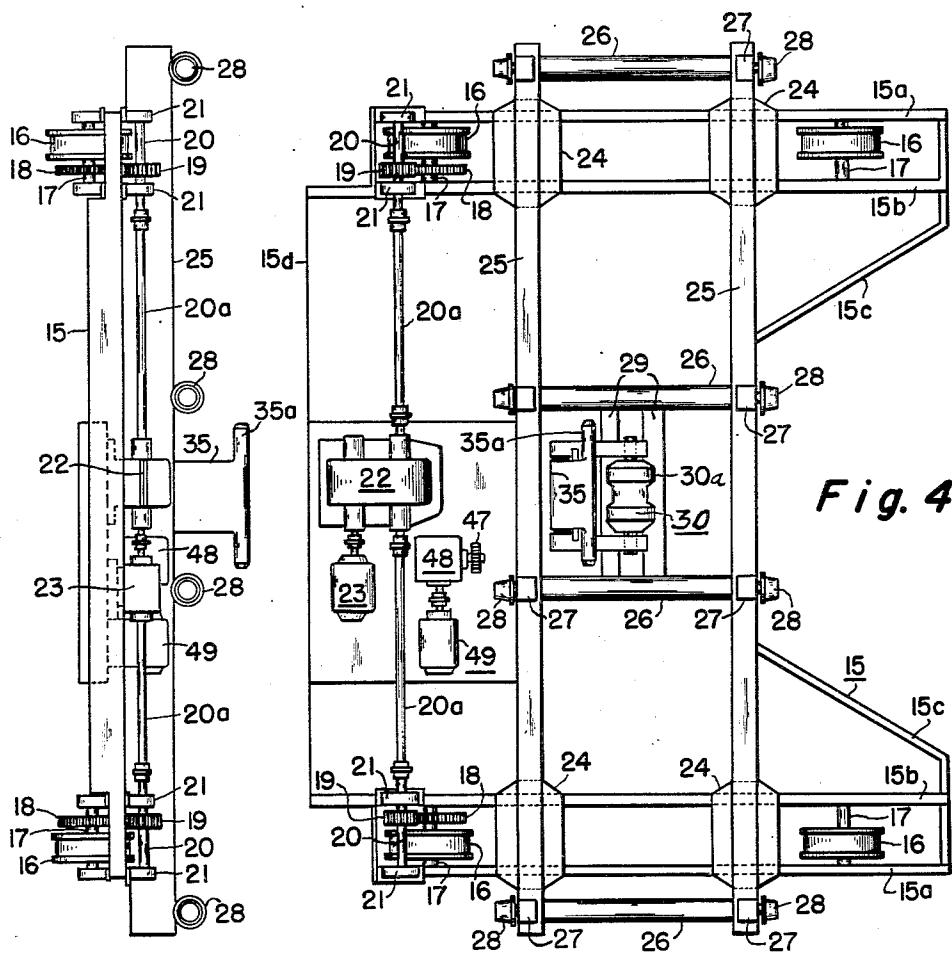
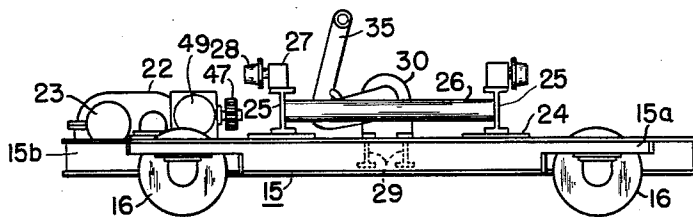


Fig. 6



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Fig. 10

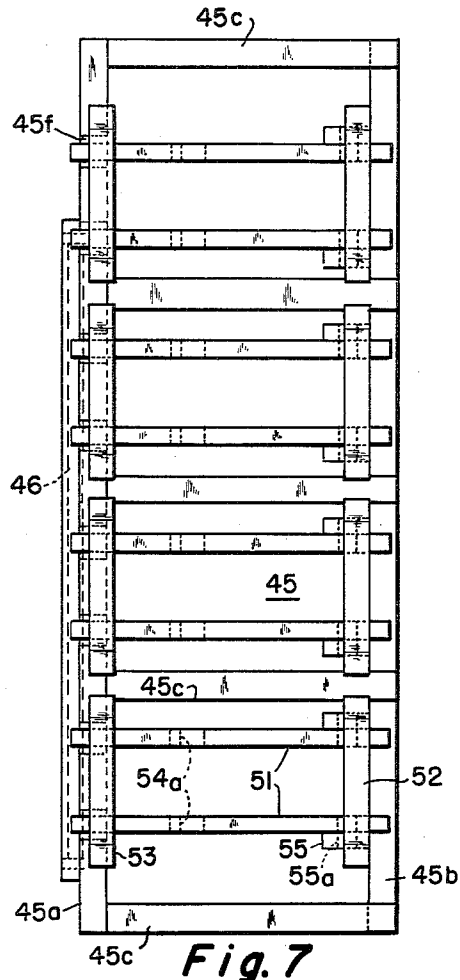
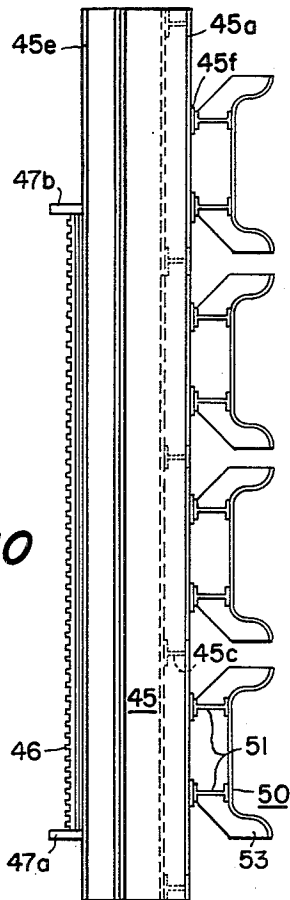


Fig. 7

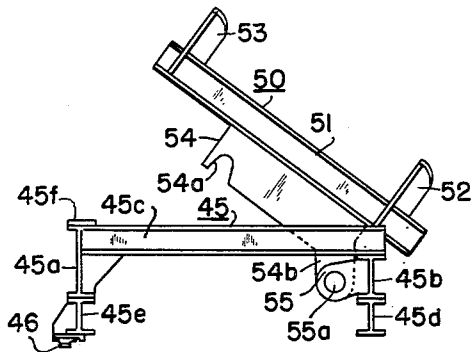


Fig. 9

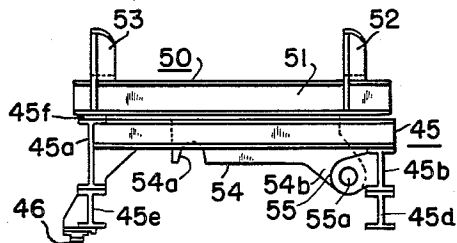


Fig. 8

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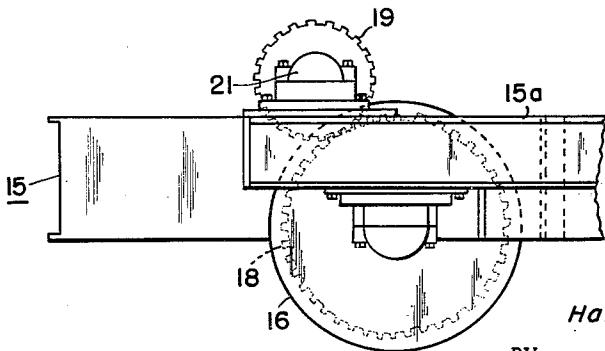
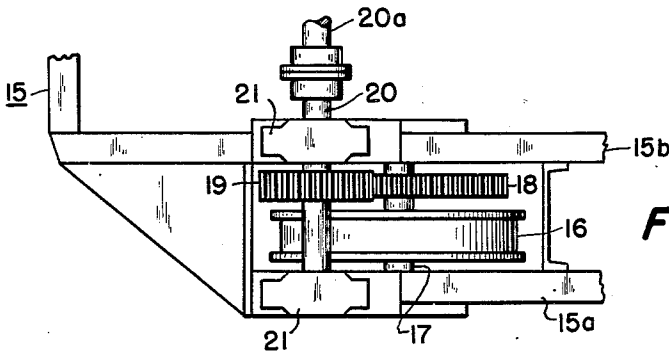
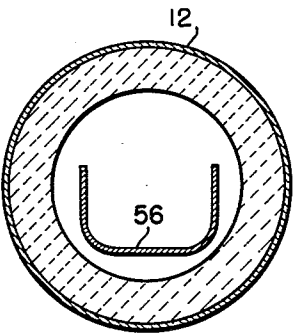
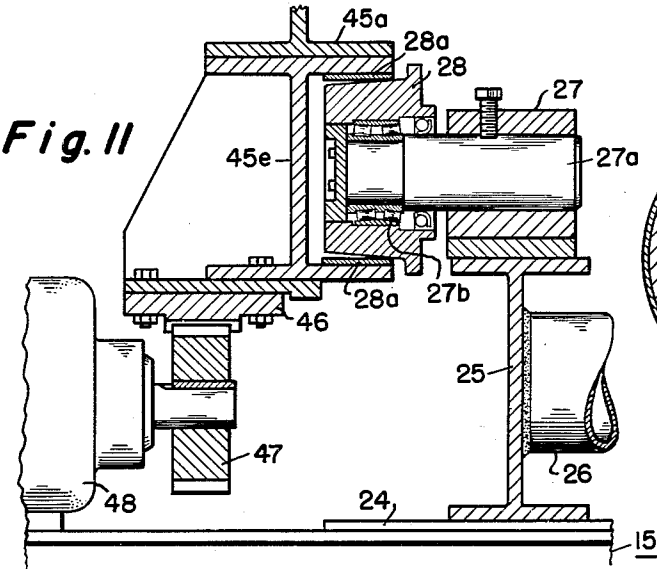
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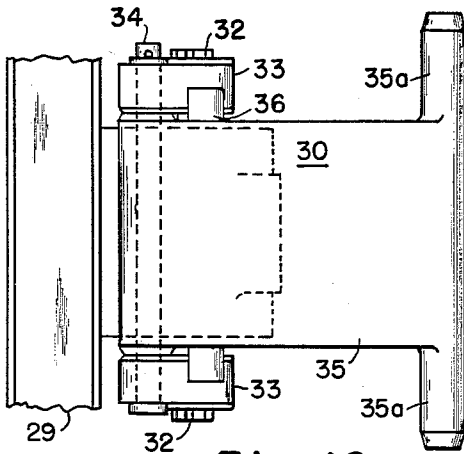


Fig. 16

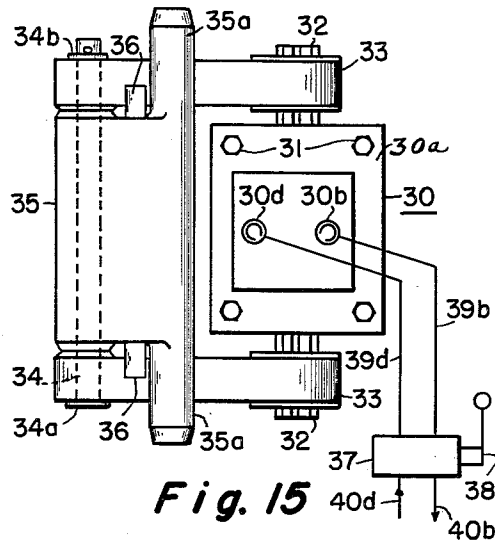


Fig. 15

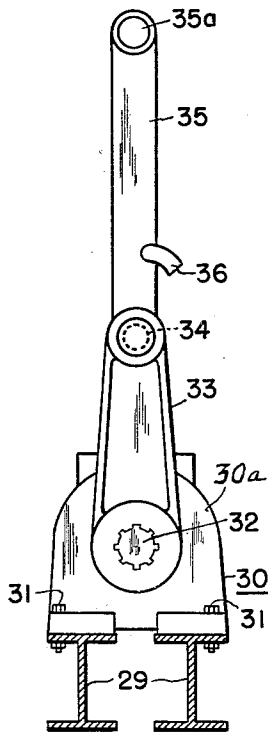


Fig. 18

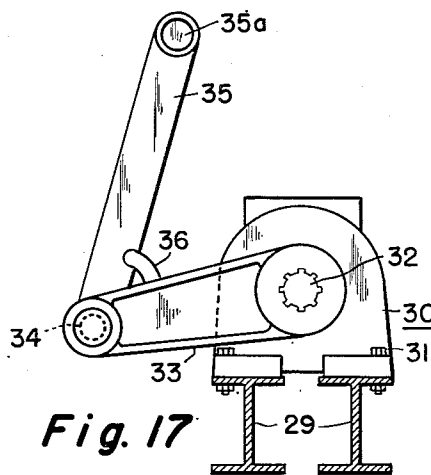


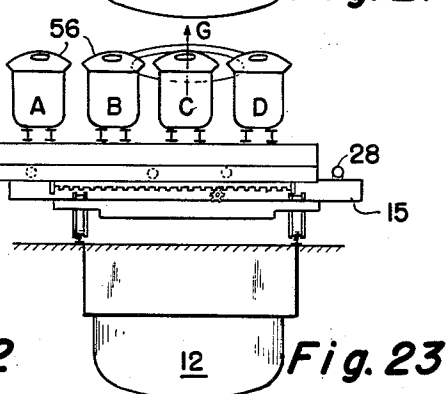
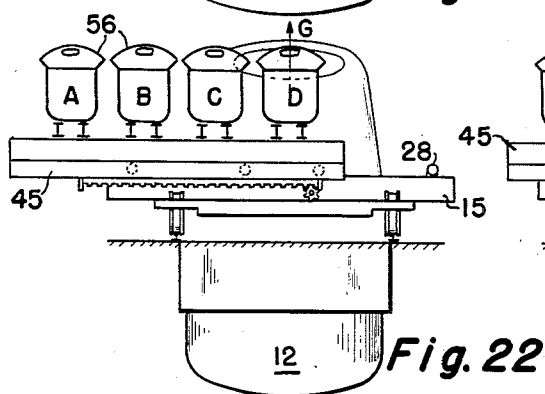
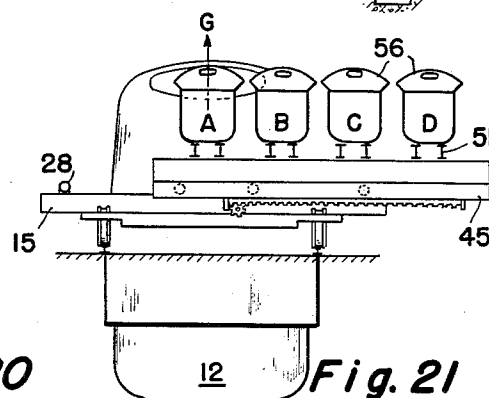
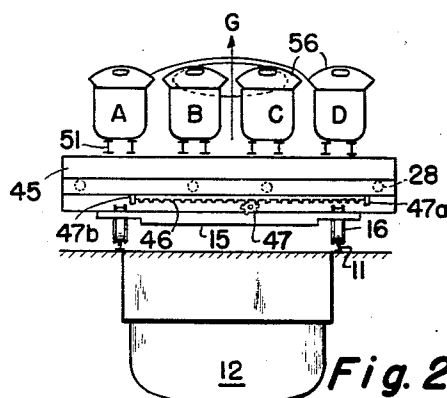
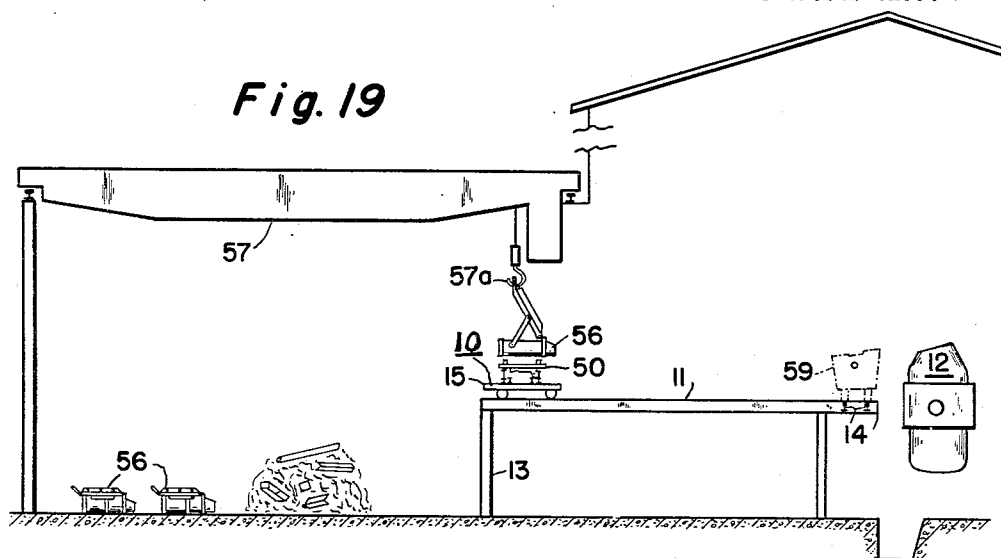
Fig. 17

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SCRAP CAR

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8 Sheets-Sheet 8

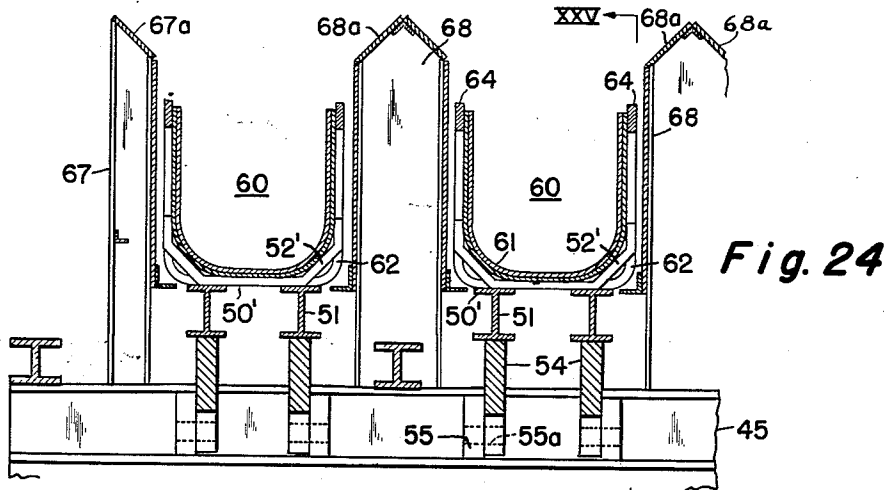


Fig. 25

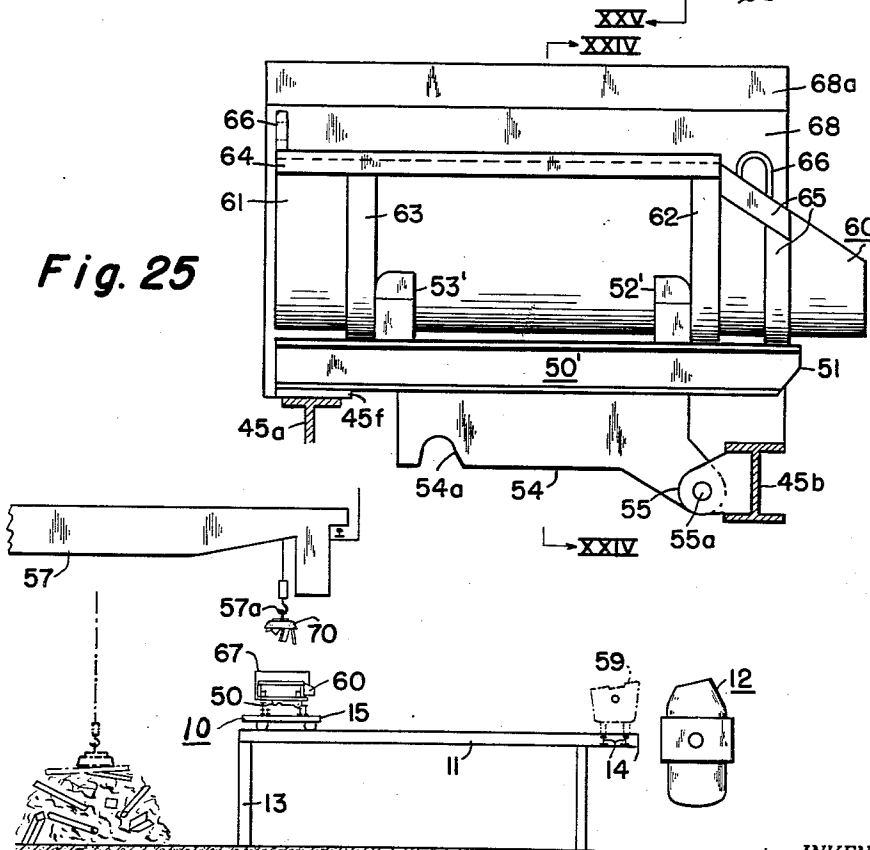


Fig. 26

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2,836,309

SCRAP CAR

Harry L. McFeaters, New Castle, Pa., assignor to Pennsylvania Engineering Corporation, New Castle, Pa., a corporation of Pennsylvania

Application January 5, 1956, Serial No. 557,499

14 Claims. (Cl. 214—18)

This invention relates to a transport and delivery car for scrap and like material and particularly, to an improved car or device that may be employed to receive and carry a group of scrap containers, holders or boxes to the charging opening of a refining vessel or furnace and to, at the latter position, successively align and discharge contents of the scrap containers, holders or boxes into the vessel or furnace.

A construction devised in accordance with my invention is particularly suitable for an installation requiring relatively large amounts of scrap materials in charging the refining vessel or furnace or which employs scrap metal with molten metal in the refining or processing of metal, such as steel. In the relatively new field of the so-called oxygen-blow type of converter or refining vessel operation, there has been a need for scrap car installation that will handle relatively large quantities of scrap in an economical and practical manner. In this connection, it may be noted that the present day tendency is to employ relatively large size vessels of from about 35-ton capacity, through 65 ton and larger size refining vessels. Since the scrap content of a melt may approach 50% thereof, it is apparent that its handling is an important phase of the processing.

It has thus been an object of my invention to devise an improved scrap car or charging device which can be effectively utilized with a larger capacity refining vessel or furnace;

Another object has been to provide a scrap car which will handle a group or series of scrap containers or boxes and effectively deliver or discharge the contents of each container in a suitable manner into the refining vessel or furnace at the proper time;

These and many other objects of my invention will appear to those skilled in the art from the drawings and the specification.

In the drawings, Figure 1 is a top plan view illustrating a scrap car or device constructed in accordance with my invention and in a cooperating relationship with the charging mouth or opening of a refining vessel or furnace; this figure also shows extreme traverse positions of movement of an upper part or frame of the device;

Figure 2 is a side view in partial section on the same scale as Figure 1 and showing the device of my invention in the position of Figure 1 with, however, one of the scrap boxes in an aligned delivery position with respect to the refining vessel and ready to assume an unloading position;

Figure 3 is a view similar to Figure 2 but with the scrap box in a raised, tilted or scrap-delivery position;

Figure 4 is a top plan view on the scale of Figure 1 through a lower half of the device of Figure 1 to illustrate its lower or truck frame construction;

Figure 5 is a side view in elevation of the construction of and on the same scale as Figure 4;

Figure 6 is a back end view in elevation of the scale and construction of Figure 4;

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Figure 7 is a top plan view on the scale of Figures 4, 5 and 6 of an upper half or traverse traveling part or frame construction of the device of Figure 1;

Figure 8 is a side view in elevation on the scale of 5 and showing the structure of Figure 7 with its tilting support or cradle in a normal or lowered position;

Figure 9 is a view similar to Figure 8 but showing a tilt support or cradle in an upper-tilted and scrap-delivering position;

Figure 10 is a back end view in elevation on the scale 10 and of the structure of Figure 7;

Figure 11 is an enlarged fragmental section taken on the line XI—XI of Figure 1 and illustrating how the upper or traverse part or frame is moved from one scrap-box-aligning position to another;

Figure 12 is a section on the scale of and taken along the line XII—XII of Figure 3;

Figure 13 is an enlarged top plan corner detail of the scale of Figure 12 and taken along the line XIII—XIII 20 of Figure 1 of the drawings; it shows the mounting of one of the wheels of the lower part which functions as a drive wheel for the car or device;

Figure 14 is a fragmental view in elevation on the scale of and from an outer side of the structure of Figure 13;

Figure 15 is a top plan view illustrating a hydromotor and linkage arrangement or assembly which is centrally 25 positioned on the upper or traverse traveling frame to raise and lower or tilt each scrap box holder, cradle or support when it is moved into alignment or to an operating relationship therewith; this figure is on the enlarged scale of Figures 11 to 14 and shows a lower position of the linkage also illustrated in Figures 16 and 17;

Figure 16 is a back view in elevation of the arrangement or assembly of Figure 15 and showing linkage in the 30 lower position of Figure 17;

Figures 17 and 18 are views on the scale of Figures 15 and 16 and are side elevations of the structures of such figures in their lower and upper positions;

Figure 19 is a schematic view in side elevation illustrating a utilization of the scrap car device of Figures 1 to 18, 40 inclusive, in a steel mill layout and with a converter vessel; this view is on a greatly reduced scale;

Figures 20 to 23, inclusive, are slightly enlarged views from the standpoint of Figure 19, taken from the back end 45 of the assembly of Figure 1, and illustrating different positions of the scrap boxes; in this connection, Figure 20 shows the normal central position of the upper frame when the device is being moved longitudinally (see Figure 19) to and from a vessel-charging position, while 50 Figures 21, 22 and 23 illustrate three of four possible delivery positions of the scrap boxes.

Figure 24 is a fragmental section in elevation taken along the line XXIV—XXIV of Figure 25 and is of a 55 slightly enlarged scale with respect to Figures 1 to 3, inclusive; it illustrates a modified type of upper or traveling frame construction employing a slightly modified scrap box, container or holder;

Figure 25 is a side view in elevation on the scale of 60 Figure 24 and taken along the line XXV—XXV of Figure 24;

And, Figure 26 is a schematic view in side elevation of the general type of Figure 19, but illustrating a utilization of the scrap car device of Figures 24 and 25.

In accordance with my invention, I have devised and 65 provided a scrap car or a device 10 that is movable as a unit between suitable operating positions such as between a source of scrap and the front or discharging end of a refining vessel or furnace 12 (see Figures 19 and 26). At the latter position, its upper frame or part 45 is mov- 70 able to align one of a series of scrap containers, holders or boxes with the charging opening or mouth of the fur-

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nace or refining vessel (see Figures 20 to 23). The device is capable of receiving, carrying and handling a series or a plurality of scrap charging boxes 56 or 60, both when it is moved as a unit and when its upper part 45 is being moved with respect to its lower or truck part 15.

The installation or construction enables the handling of relatively large quantities of scrap material from the standpoint of a single unit or device, such that the scrap requirements of a particular furnace or refining vessel may be handled by one device and its load of scrap boxes. The scrap box assembly is supported, tilted and utilized in a selective and progressive manner to feed large quantities of scrap material in a progressive manner and as required.

Referring to the drawings and particularly to Figures 1 and 19, I have shown a scrap car, device, construction or unit 10 made in accordance with my invention. It is adapted to run as a unit or car 10 on a pair of rails 11 (see Figures 1 and 19) on which it can be moved in a longitudinal direction between a source of scrap (a back or a charging position) and a furnace or vessel installation 12 (a discharging position). The forward position generally represents a discharging position with respect to the mouth or opening of the furnace or vessel 12.

As shown particularly in Figures 2, 3, and 20 to 23, an upper part, traverse table or frame structure 45 is adapted to move sidewise of and on the lower part 15 of the unit 10 or transversely of the refining vessel or furnace 12. Normally, the unit 10 will be moved on the rails 11 with the upper frame part 45 in the position of Figure 20 and until the unit 10 engages a front stop 11a (see Figures 2 and 3). Then, at this time, in order to align a particular scrap box such as A, B, C or D of the set of boxes 56 with a central guide line G at the furnace opening, the upper frame 45 is moved on rollers 28 transversely of the lower carriage or frame part 15, while the latter part and the unit 10 as a whole is being retained in the forward position of Figures 2 and 3.

Figures 21, 22 and 23 show three aligned positions (as represented by scrap boxes A, C and D) to illustrate how all of the scrap boxes A to D, inclusive, may be handled or successively and progressively aligned or moved to a discharging position when the unit 10 is at the delivery end of rails 11. When one of the scrap boxes 56 is moved to an aligned position G, it is also in a cooperating position with a tilt, swing structure or frame 30 for pivotally swinging or raising it (as illustrated in Figure 3) to discharge scrap therefrom into the refining vessel 12.

Figure 1 illustrates extreme left and right or transverse side positions (E and F) to which outer scrap boxes A and D will be moved on the upper frame 45 during the steps of aligning each cradle and its scrap box with the furnace opening to discharge scrap contents into the opening. It will also be apparent that E and F indicate extreme positions of the upper frame 45 during its movement with respect to the bottom frame 15.

Referring particularly to Figures 4, 5 and 6 of the drawings, the lower truck, carriage frame part or assembly 15 has transverse side member pairs comprising members 15a and 15b of I-beam construction which, with front beam members 15c, and back end portions of a metal floor plate construction 15d, define outer boundaries of the lower frame or part 15. This frame is reinforced by transverse members 15b which are located in a spaced and parallel relationship with the members 15a. The beam or structural members 15a, 15b and 15c carry and are secured to the bottom plate construction 15d. The angular front members 15c define, as shown particularly in Figure 4, a centrally-offset open front side for the lower or truck frame part 15 in the direction of the refining vessel 12. It will be noted that the vessel is illustrated as a Bessemer or oxygen-blow type of large capacity, such as used in present-day installations.

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The lower part 15 has flanged track wheels 16 operatively mounted at its corners to engage the track or rail members 11. Each wheel 16 is keyed or splined to a stub shaft 17 that is journaled between and on the structural members 15a and 15b. The front set of wheels 16 are shown as idler wheels while the rear set are shown as driven wheels (see also Figures 13 and 14).

Driving pinions 18 (see Figures 4, 6, 13 and 14) are keyed on the back stub shafts 17 and engage gears 19 that are keyed on drive shafts 20. The drive shafts 20 are journaled in bearings 21 that are mounted on the structural members 15a and 15b. The drive shafts at their inner ends are coupled to extending drive shaft portions 20a which are driven in synchronism by a speed reducing unit 22 and driving motor 23 (see also Figure 1). The motor 23 (as shown particularly in Figures 1, 4 and 5) as well as the unit 22 may be of any standard commercial construction, such as an electric motor with controls (not shown), either mounted on the unit 10 or connected through suitable sliding contacts to a remote control panel in the shop. The motor 23, whether of a fluid or electrical type, is reversible as to its rotation, so that the truck 10 can be moved back and forth on its rails 11 between positions such as indicated in Figure 19 of the drawings.

Mounting pads or plates 24 rest on and are secured to the beam member pairs 15a and 15b at each end of the lower frame 15. These mounting pads 24 receive and carry a pair of upper-level, central beam or structural members 25 which may also be of I-beam construction. It will be noted that the members 25 extend transversely of or towards side ends of the structure of the bottom part 15 to further reinforce it and provide a runway for the upper frame or part 45. The pair of spaced-apart structural members 25 thus define upper reaches for the lower or stationary frame part 15. The construction is reinforced by cross-connecting members, such as tubes 26, which are secured between members 25 and complete the framework of the runway construction of the lower part 15 (see also Figure 11).

To ride and guide the upper frame part 45, I have shown a spaced series of flanged roller or wheel pairs 28 along the structural framework (see Figures 4, 5 and 6). As shown in Figure 11, each roller 28 is journaled on bearings 27b of one end of a pin or stub shaft 27a. The shaft 27a is, at its other end, supported by and carried within a mounting sleeve 27 that is secured to an upper flange portion of the structural members 25. Set screw 27c is employed to lock the pin shaft 27a in position.

Referring particularly to Figures 7 to 10 of the drawings, the upper, traverse or traveling frame part 45 is made up of back and front structural members 45a and 45b, and connecting end members 45c, all of which may be of I-beam construction. As particularly shown in Figure 11, and as also shown in Figures 7 to 10, the back structural member 45a, like the front member 45b, carries a second extension structural member on its bottom portion or flange. In the case of the member 45a, the bottom member is 45e and in the case of the member 45b, the bottom member is 45d. A gear rack member 46 is secured (as also shown in Figure 7) along and to the bottom member 45e to project backwardly and downwardly therefrom to engage or mesh with a driving gear 47 (see particularly Figure 11). The gear 47 is keyed on a shaft of a gear reduction unit 48. The unit 48 may be of conventional construction and is driven by a rotary and reversible motor 49 which, like the motor 23, may be of an electrical or fluid type. Travel-limit stop pieces 47a and 47b (as shown particularly in Figure 10) are secured to ends of the rack 46 to limit travel of the upper frame 45 between extreme positions, such as illustrated by E and F of Figure 1.

Also, as shown in Figures 8 to 10, inclusive, the upper frame 45 carries a series of individual tilt cradles or frames 50 that are operatively mounted thereon for swing-

ing movement with respect thereto. Each cradle 50 has a pair of spaced-apart structural or beam members 51 that, at their back ends, are adapted to rest upon bumper pieces or pads 45f. The latter are mounted on upper flange portions of the back structural members 45a of the frame 45 (see Figures 8 and 9). U-shaped front and back cradle pieces 52 and 53 are secured across the pair of structural members 51 to complete the upper portion of the cradle frame 50 and to receive and support a scrap box, such as 56, thereon.

To the under-flange portion of each structural member 51 of each cradle 50, I have secured a downwardly-projecting swing member 54. I thus provide each cradle 50 with a pair of members 54 that are under-slotted or grooved at their back end portions 54a to receive tongue portions or ears 35a (see Figures 15 to 18) of a link or pusher head member 35 of tilting frame assembly or construction 30. However, it will be noted that only a centrally-aligned cradle frame 50 or associated scrap box 56 which in Figure 21 is A, in Figure 22 is D, and in Figure 23 is C and, of course, may be B where B is aligned with G, is engaged by or operatively cooperates with the tongue portions 35a of the swing structure 30.

Back end portions of the pair of swing members 54 have pivot ears 54b (see Figures 8 and 9) that are pivotally mounted on pins 55a. Cooperating ears 55 carry the pins 55a and are secured to and project from inner portions of the web and flanges of the front structural or frame member 45b.

As shown in the detail of Figure 11, the rollers 28 of the runway portion of the lower frame part 15 are adapted to roll along wear pieces or strips 28a. The wear strips 28a are secured along the under-sides of upper and lower flanges of the front and back, lower, extension frame members 45e and 45d of the traveling or upper frame part 45. In this manner, the upper frame part 45 has a pair of transversely-extending front and back, confining, guide-track portions that are defined by the inner sides of the frame members 45d and 45e. In other words, the track portions are defined by inner reaches of the upper and lower flanges of the frame members and as spaced by their webs. Thus, the upper frame part 45 is always carried in an operating relationship and in proper alignment with respect to the lower frame part 15 by the confining track defined by the structural members 45d and 45e. In this connection, the operating relationship of the wheels or pulleys 28 is the same for the member 45d as shown for the member 45e of Figure 11.

Reference is made to Figures 15 to 18 of the drawings which illustrate details of the swing or tilting structure or frame construction 30. The construction 30 is (as shown in Figures 1 and 4 to 6) centrally mounted on the lower frame part 15 and between the structural runway members 25 and their cross-support members 26. As shown in Figures 4 and 5, short-length structural or I-beam members 29 are secured between the central pair of cross members 26 and thus, directly support or mount a hydromotor 30a.

The hydromotor 30a may be of standard construction that is provided with a 100° movement or swing. As shown particularly in Figure 15, the hydromotor 30 has inlet and outlet ports 30b and 30d which may be supplied by a pair of lines 39b and 39d through a three-way valve 37. As shown, the valve 37 may be operated by hand lever 38 and has a connection 40d to a source of pressure fluid and a connection 40b to a storage tank. The valve 37 may be moved by its arm 38 to shut off fluid flow through the lines 39b and 39d, to cause fluid to flow through 39d in a positive direction and through line 39b in a return or negative direction, and to vice-versa. Thus, the motor 30a may be actuated forwardly and backwardly within its 100° swing.

The motor 30a of the swing frame 30 may be secured on the short-length structural members 29 by bolt and

nut assemblies 31 to project upwardly therefrom. A drive shaft 32 extends from opposite sides of the motor 30a and its ends are splined to secure and carry swing arms 33 thereon. Each swing arm member 33 is, at its other end, pivotally connected by a pivot shaft 34 to an upwardly-projecting link or swing head member 35. As disclosed particularly in Figure 15, pivot shaft 34 is held in position at one end by its head portion 34a and at its other end is secured in position by washer and cotter pin assembly 34b.

The link or pusher head member 35 operates an aligned tilting cradle or frame 50. Projecting side ears or tongue portions 35e, as previously explained, are adapted to engage within interfitting groove portions 54a of an aligned cradle frame 50.

As shown in Figures 2, 3, 17 and 18, the pusher head 35 is adapted to move into a collapsed, angular or knee-bend position with respect to the operating arms 33 when the cradle frame 50 is in the "down" position of Figures 15, 16, and 17. I have shown a pair of side-mounted stop projections 36 secured to the swing member 35 to limit the "down" position to the position shown.

In Figures 3 and 18, I have shown the swing member 35 in its fully vertically or upwardly-projecting or extended relationship with respect to the pair of swing arm members 33. This constitutes its maximum tilt or raise position for an aligned one of the cradle frames 50. Each scrap box 56 (see Figures 2 and 3) is held in position on one of the cradle frames 50 by its wedging engagement with the front and back guide members 52 and 53 and by the engagement of front and back hoop, strap or flange portions 56a and 56b.

It will be apparent that any suitable type of scrap box may be employed with the scrap car 10 of my invention. However, for the purpose of ready illustration, in the embodiment of Figures 1 to 23, I have shown a scrap box constructed in accordance and which may be operated in accordance with the disclosure of my co-pending application Serial No. 504,604 filed April 28, 1955 and entitled "Scrap Box Construction." The scrap car construction 10 here disclosed does not require a tiltable scrap box, although it may use such a type. Since the scrap car, itself, provides suitable tilting action, a simple holder or carrier type of scrap box may be utilized if desired.

Referring to Figure 19, I have somewhat diagrammatically shown a layout which may utilize a scrap car of my invention. Platform 13 carries the rails 11 for the scrap car 10 and may have a pair of crosswise-extending furnace-front-located rails 14 to define a track for the travel of hot metal ladles 59. Thus, the vessel 12 may be charged from substantially the same position level employing the scrap car 10 and the hot metal ladle 59. Scrap boxes 56 may be loaded by means of an overhead traveling crane 57 from a scrap pile and then raised by crane hook 57a to a position on one of the cradles 50 of the car 10. After a full set of scrap boxes, such as A, B, C and D have been thus positioned, the car 10 may then be moved on rails 11 to the position of Figures 1 and 2. Then, at such position, the upper part 45 of the cart is moved on its runway to selectively align and discharge each of the boxes into the vessel 12. When this operation has been completed, the car may then be moved longitudinally back to its original position of Figure 19 to receive a new set of scrap boxes.

In Figures 24 to 26 of the drawings, I have shown a slightly modified embodiment of my invention that is particularly suitable for overhead or drop-loading of scrap material. The upper or traverse frame part 45 is of the same general construction and operation as the previously-described embodiment. Also, the cradle frames 50' operate and are carried in the same manner as the frames 50 of the other construction, but are slightly modified and means is provided at their sides (endwise of the frame 45) and between adjacent tilt or cradle frames 50' to close off spacing and guide the material

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into scrap boxes, such as 60. The scrap boxes 60 are of a simple reinforced type of construction with their frame cooperating with cradle members to hold them in position on the upper frame 45.

Referring particularly to Figures 24 and 25, it will be seen that the spaced-apart beam members 51 of each cradle construction 50', define the cradle with front and back, somewhat U-shaped, upwardly-open members 52' and 53' which correspond somewhat in construction and utilization to corresponding members 52 and 53 of the other embodiment of my invention. The scrap boxes 60 are also of U-shaped, upwardly-open construction and comprise reinforced wall plating or sheathing 61, front and back banding frame members 62, and upper banding frame members 64 secured to the members 63 and to a front extension frame 65. The members 62 to 65 thus define a reinforcing skeleton framework for the scrap box 60. The members 62 and 63 respectively cooperate with the members 52' and 53', as shown in Figure 25, to hold the box 60 in position on the cradle 50'. Grab hooks 66 secured on the framing 65 provides for raising the scrap boxes if and when desired.

At the extreme ends of the structure, I have provided (as disclosed in Figure 24) upright-spreader or guide structures 67 which cooperate with intermediate spreader or guide structures 68 to direct, concentrate, and flow scrap material into the boxes 60 while, as shown in Figure 26, such material is being discharged from an overhead means, such as an electric magnet 70. The spreader structures 67 and 68, respectively, have declining top guide surfaces 67a and 68a. It will be noted that the intermediate spreaders 68 have a pair of surfaces 68a which meet in an apex, angle or gable arrangement.

What I claim is:

1. An improved scrap car apparatus for furnace and converter utilization which comprises, a cart for moving the apparatus between scrap-receiving and delivering positions, a group assembly of scrap boxes, a traverse frame operatively mounted on said cart for movement thereon, a group of swing cradles operatively mounted on said traverse frame for raising and lowering movement with respect thereto and for carrying the scrap boxes, swing mechanism mounted on said cart and constructed to cooperate with a selected individual one of said cradles when said traverse frame is moved to substantially align the one cradle and its scrap box with a charging opening of the furnace, and said swing mechanism having actuating means to only raise the aligned cradle and its associated scrap box to discharge scrap into the charging opening.

2. An apparatus as defined in claim 1 wherein, said swing mechanism has a swing arm, said swing arm has at least one projecting tongue portion, each of said cradles has at least one groove portion to separately receive the tongue portion of said swing arm when each said cradle is moved into an aligned position.

3. An apparatus as defined in claim 1 wherein said swing mechanism is centrally positioned on said cart and selectively cooperates with each of said cradles.

4. An apparatus as defined in claim 1 wherein, the said cradles are successively moved into a cooperating relationship with said swing mechanism, and said mechanism has means to raise and lower each of said cradles when it is in a cooperating relationship with said swing mechanism.

5. An improved apparatus as defined in claim 1 wherein, guide means is positioned on said upper frame to project upwardly therefrom along said cradles and between adjacent cradles and their associated scrap boxes to guide scrap material into the scrap boxes when it is delivered from an overhead position with respect to the apparatus.

6. An improved scrap car apparatus for furnace and converter utilizations which comprises, a lower cart frame

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having wheels engaging a track for moving the apparatus between scrap-receiving and scrap-delivering positions, an actuating mechanism mounted on said cart and connected to at least a pair of said wheels to drive the apparatus back and forth on the track, an upper traverse frame having a series of side-by-side positioned cradle frames tiltably mounted thereon, upwardly-open scrap containers carried by said cradle frames, means for moving said upper traverse frame back and forth on said lower frame to align each of said cradles and its associated scrap container with a charging opening in the furnace, and actuating means cooperating with an aligned one of said cradle frames to raise it and its associated scrap container on said upper frame to discharge scrap into the furnace opening.

7. An improved scrap delivery apparatus for furnace and converter utilization which comprises, a mobile unit for carrying scrap and delivering it into a charging opening in the furnace, said unit having an upper frame operatively mounted thereon for movement with respect thereto, said upper frame having a rack therealong, at least a pair of side-by-side positioned cradles, actuating means carried by said unit and engaging said rack to move said upper frame back and forth on said unit to successively align each of said cradles with the charging opening, means pivotally mounting said cradles on said upper frame for raising and lowering movement thereon to deliver scrap into the charging opening, and a swing mechanism on said unit constructed to engage with each successively-aligned cradle and selectively actuate it to separately raise and lower each cradle on said upper frame when the cradle is aligned with the charging opening.

8. An improved apparatus as defined in claim 7 wherein, each of said cradles has a latch-groove portion, and said swing mechanism has a tongue portion to selectively engage within and disengage from the groove portion of each of said cradles when each said cradle is moved into and out of alignment with the charging opening.

9. An improved apparatus as defined in claim 7 wherein, said upper frame has stop means limiting its movement on said unit, and said swing mechanism comprises a hydromotor and an operating arm that selectively engages each of said cradles.

10. An improved scrap car apparatus for delivering scrap into a charging opening of a furnace or converter which comprises, a cart for moving the apparatus between scrap-receiving and delivering positions, a group of scrap-carrying and delivering boxes in a substantially planar group assembly in horizontal progression transversely of said cart, a lift means operatively positioned on said cart to project upwardly therefrom, said boxes and said lift means having cooperating portions to latch with respect to each other, means for moving said boxes as a group transversely of said cart and moving a selected box of the group into and out of a scrap-feeding alignment with the charging opening while simultaneously moving the selected box into and out of an interlatching relationship with said lift means, and means for actuating said lift means to raise and lower the aligned and interlatched box into and out of a scrap-discharging position with respect to the charging opening.

11. An improved apparatus for receiving, carrying and delivering scrap into a charging opening of a furnace or converter which comprises, a substantially horizontally-disposed group assembly of scrap boxes, a cart for moving said boxes between scrap-receiving and delivering positions, means operatively mounted on said cart and associated with said boxes to selectively-align each box with respect to the charging opening, and tilt means operatively engaging each box after it has been moved into a selectively-aligned relation with respect to the charging opening.

12. A scrap car apparatus as defined in claim 11, wherein, a support frame carries said boxes as an as-

sembly, said first-mentioned means is operatively connected to move said frame transversely of said cart to progressively-align each selected box with the charging opening, and said tilt means is centrally-disposed on said cart to operatively engage each box after it has been moved into its aligned relation with respect to the charging opening.

13. A scrap car apparatus as defined in claim 11 wherein, each of said scrap boxes has an under-positioned swing member, and said tilt means has a tilting frame assembly and a pusher head to engage with said swing member when each box as selected has been moved into an aligned relationship with the charging opening.

14. An improved scrap car apparatus for delivering scrap into a charging opening of a furnace or converter which comprises, a cart frame having wheels for movement between scrap-receiving and scrap-delivering posi-

tions, an upper transverse frame having at least one scrap-carrying tilt cradle, means for moving said upper frame with respect to said lower frame to substantially align said cradle with the charging opening, means for tilting said cradle at its aligned position to discharge scrap into the charging opening, and said means for tilting and said cradle having side-aligning slide-in joint portions to operatively engage with each other when said first-mentioned means has moved said cradle into alignment with the charging opening.

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