Jan. 17, 1956 F. G. GARLOCK 2,730,964

HOPPER CAR

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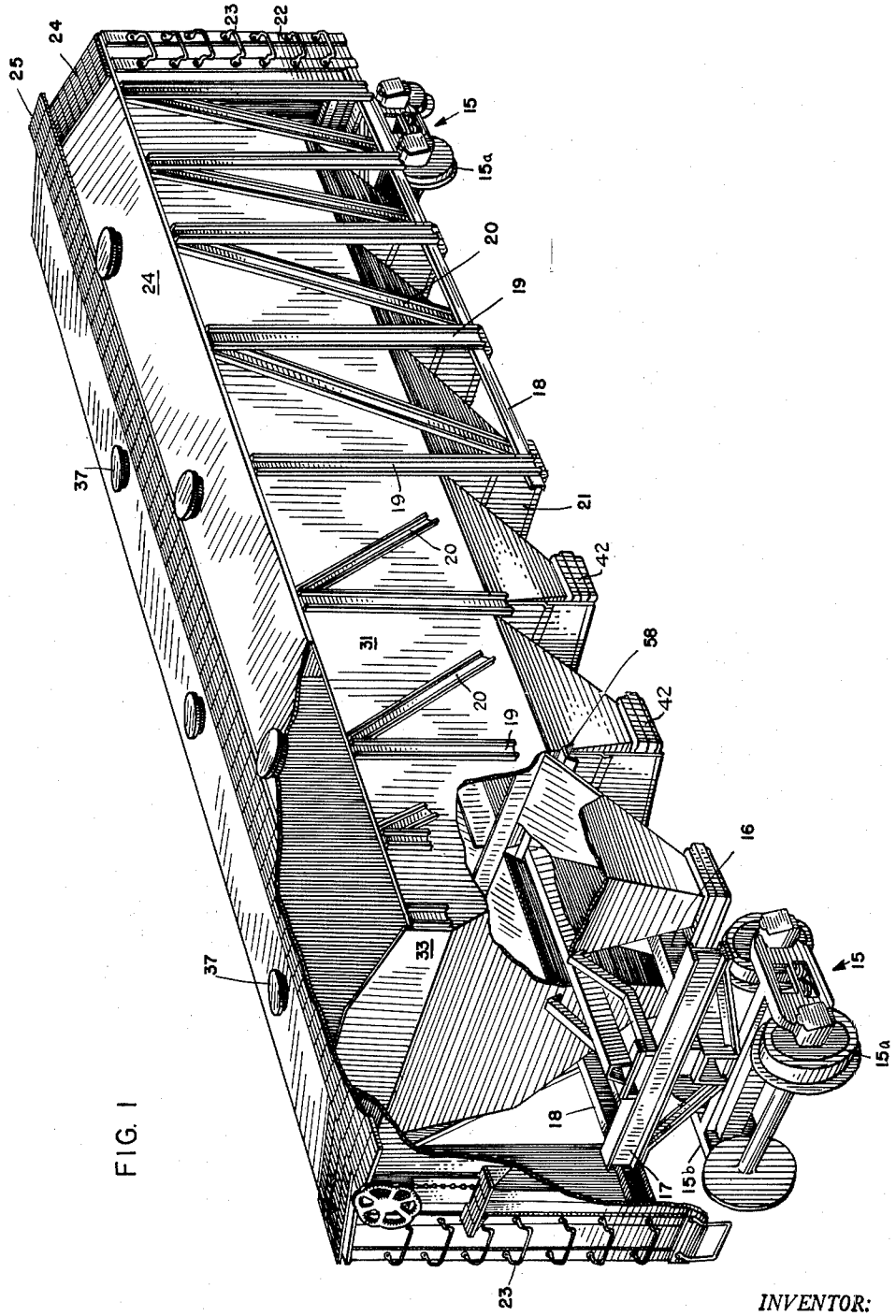


FIG. 1

INVENTOR:
FRED G. GARLOCK
BY
Smith, Olsen & Baird,
ATT'YS

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FIG. 2

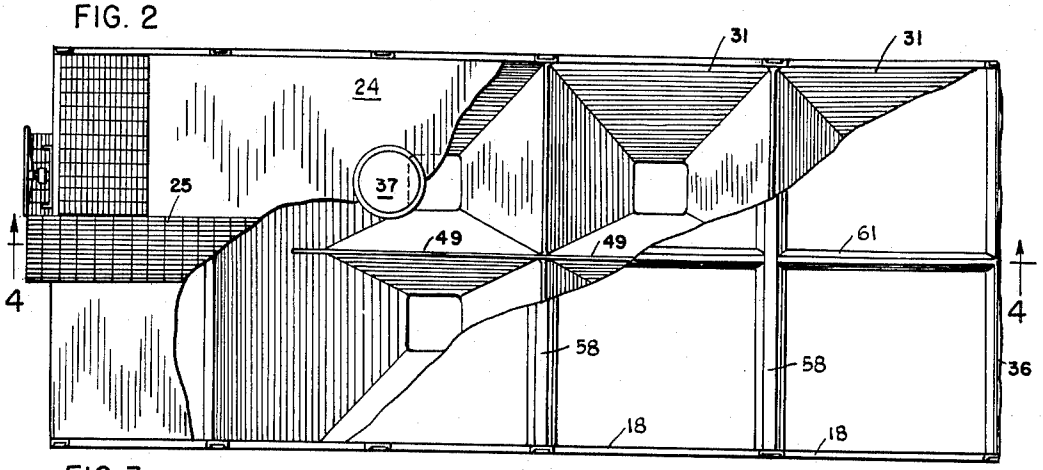


FIG. 3

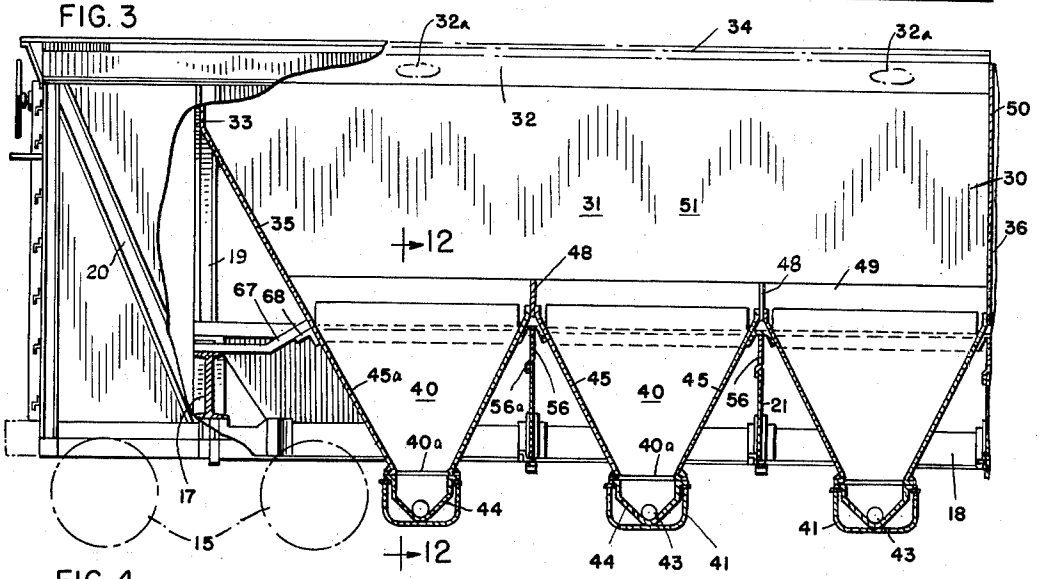
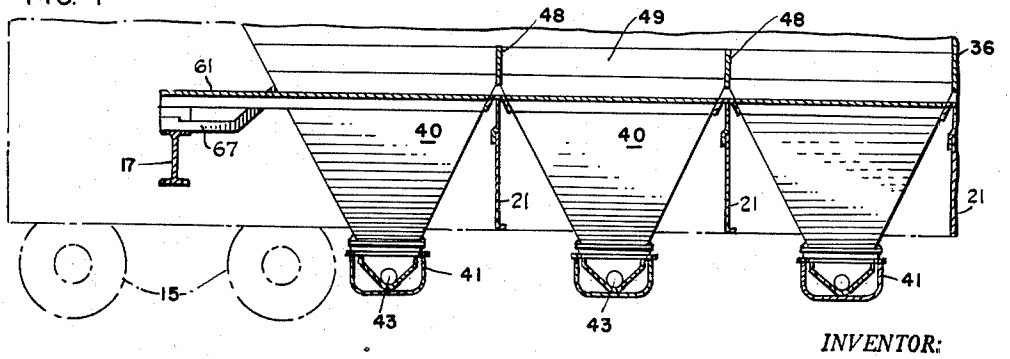


FIG. 4



INVENTOR:

FRED G. GARLOCK

BY

Smith, Olsen & Baird,

ATT'YS

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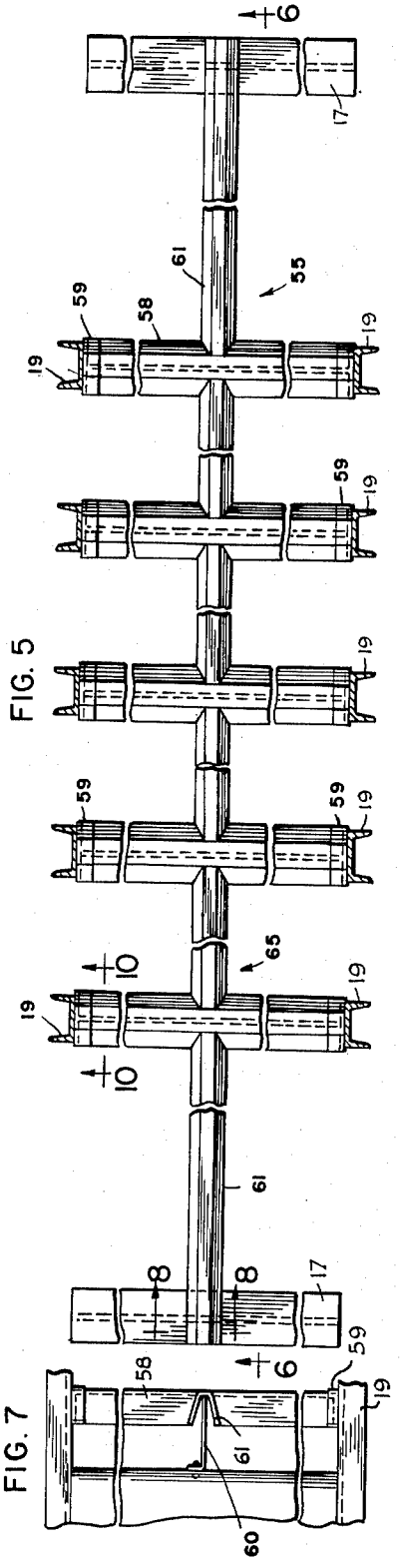


FIG. 5

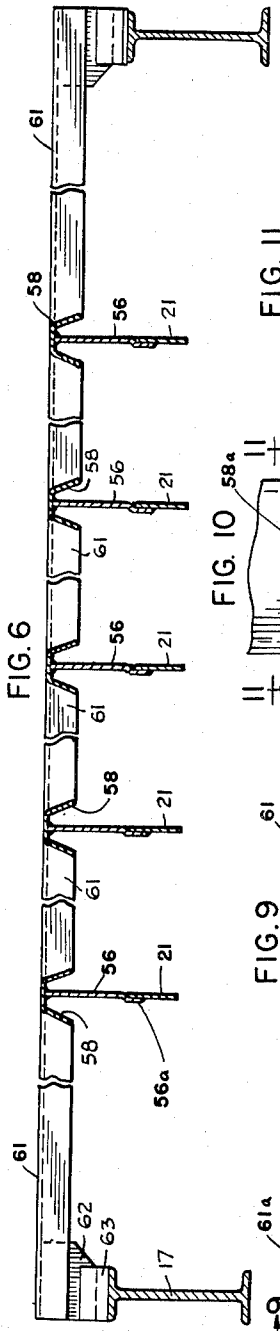


FIG. 6

FIG. 7

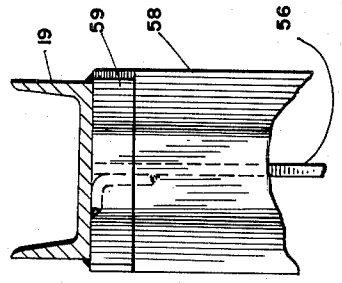


FIG. 11

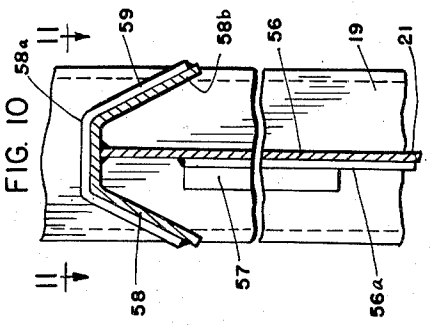


FIG. 10

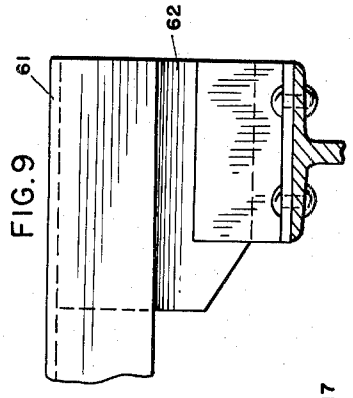


FIG. 9

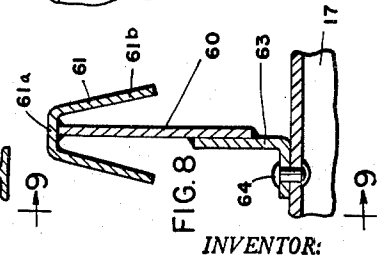


FIG. 8

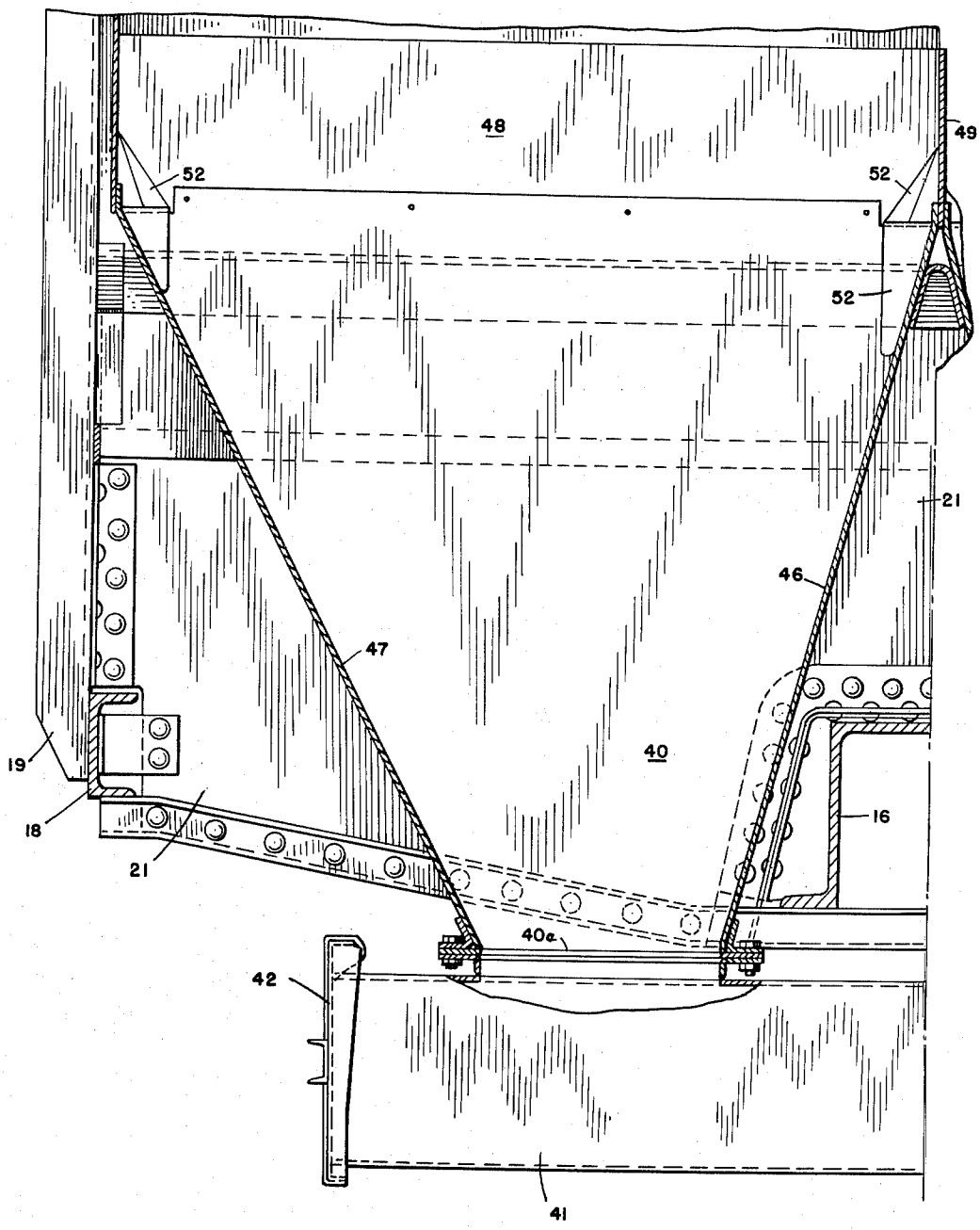
INVENTOR:
FRED G. GARLOCK
BY
Smith, Olsen & Baird,
ATT'YS

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FIG. 12



INVENTOR:
FRED G. GARLOCK
BY
Smith, Olsen & Baird,
ATT'YS

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HOPPER CAR

Fred G. Garlock, Chicago, Ill., assignor to General American Transportation Corporation, Chicago, Ill., a corporation of New York

Application March 10, 1950, Serial No. 148,897

4 Claims. (Cl. 105—248)

This invention relates to improvements in storage bins and hopper cars for storing or transporting in bulk finely divided or pulverulent or ganular materials, such as wheat flour, sand, chemicals, or the like. The invention may be employed with particular advantage in the construction of cars having storage bins provided with a plurality of hoppers through which the contents of the car may be discharged.

The transportation in bulk of commodities such as those mentioned above is of commercial advantage because of the great saving in space and labor as compared with the former practice of loading and shipping these commodities in sacks or packages. To facilitate the discharge of such commodities or materials, it is desirable to provide the storage bin or chamber with a plurality of hoppers, preferably distributed throughout the area of the bin, and the construction and proper support of the bin and hoppers has presented a substantial problem.

The principal object of the present invention is to provide an improved method of construction of a car of the type just referred to whereby the storage bin is constructed as a unit having one or more storage chambers provided with a plurality of hopper bottoms which are individually supported in a novel manner upon the frame structure of the car. A further object of the invention is to provide an improved car or storage bin structure comprising one or more separate storage bins or compartments each provided with a plurality of funnel-shaped hopper bottom portions, in combination with a supporting structure carried by the underframe of the car and made up of longitudinal and transverse supporting members which engage the bottom of the storage bin between the funnel-shaped hopper bottom portions thereof. Still another object of the invention is to provide an improved method of constructing and assembling a storage bin or hopper car including the steps of providing a supporting structure including longitudinal and transverse supporting members connected together, then forming a storage bin structure comprising a plurality of funnel-shaped hopper bottom portions, then securing the hopper structure on the supporting structure with the longitudinal and transverse members extending between the hopper bottom portions, and then securing the supporting structure on the frame members of the car. Another object is to provide a construction wherein the storage bin and its hopper bottom portions are supported independently of the longitudinal center sill of the car so that they are largely relieved from shocks incident to the movements of the car. A further object of the invention is to provide means for storing or transporting finely divided or granular materials or the like comprising a central longitudinal saddle-like supporting member or members provided with downwardly diverging side walls, and a plurality of spaced transversely extending saddle-like supporting members having downwardly diverging side walls and having connections with said longitudinal member, in combination with a plurality of individual hopper portions which are arranged in rows longitudinally and transversely of the car and which extend on opposite sides of and are connected to said saddle-like supporting members. Other objects relate to various features of construction and arrangement which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification taken with the accompanying drawings in which one embodiment is illustrated. In the drawings,

Figure 1 shows a perspective view of a railway car embodying the features of the present invention, with parts thereof broken away;

Fig. 2 shows a partial top plan view of the car illustrated in Fig. 1 with portions thereof broken away to reveal the interior formation of the hoppers and also the supporting structure upon which the hoppers are mounted;

Fig. 3 shows a partial side elevation of the car illustrated in Figs. 1 and 2 with a portion thereof illustrated in longitudinal vertical section through the centers of the discharge openings of the hoppers which are located in one row extending longitudinally of the car;

Fig. 4 shows a longitudinal section taken on the line 4—4 of Fig. 2;

Fig. 5 shows a top plan view of the principal parts of the supporting structure upon which the hoppers are mounted, with parts thereof broken away;

Fig. 6 shows a longitudinal section taken on the line 6—6 of Fig. 5;

Fig. 7 shows an end elevation of the supporting structure illustrated in Fig. 5, looking toward the right as viewed in Fig. 5;

Fig. 8 shows an enlarged detailed section taken on the line 8—8 of Fig. 5;

Fig. 9 shows a vertical section taken on the line 9—9 of Fig. 8;

Fig. 10 shows an enlarged vertical section taken on the line 10—10 of Fig. 5;

Fig. 11 shows an enlarged vertical section taken on the line 11—11 of Fig. 10; and

Fig. 12 shows an enlarged vertical section taken on the line 12—12 of Fig. 3.

As illustrated in the drawings, the invention is embodied in a railway car comprising a pair of wheeled trucks 15 each having flanged wheels 15*a* and the usual truck frame structure 15*b* upon which there is supported the car underframe comprising a longitudinal center sill 16 and transverse body bolsters 17. This frame structure also comprises longitudinally extending side sills 18 to which are secured the lower ends of upright channel-shaped side frame members 19 reinforced by diagonal brace members 20. Between the upright side frame members 19, and secured to these members, there are a plurality of cross bearers 21 in the form of flat plates. At the ends of the car and elsewhere, if desired, the spaces between the vertical frame members 19 are closed by sheathing 22 which extends across the ends of the car and ladder bars 23 may be secured to this sheathing at the ends and sides of the car. The car also comprises a hipped roof 24, the outer margins of which are secured to the upper ends of the vertical side frame members 19, and a runway 25 extends longitudinally of the car along the middle portion of the roof.

Beneath the roof 24 and within the frame structure formed by the upright frame members, there is mounted a unitary storage bin structure 30 which extends substantially throughout the length of the car and which may comprise one or a plurality of storage bins or compartments. The walls of this storage bin structure are preferably formed of stainless steel or the like, which may be comparatively thin, and they include vertical side walls 31, top walls 32, and relatively short end walls 33 all of which are welded or otherwise secured together at

their meeting edges. The top wall **32** is reinforced at intervals by transversely extending angle bars **34** and the upright end walls **33** are formed as continuations of inclined end walls **35** which extend downwardly at the ends of the car, as shown particularly in Figs. 1 and 3. The space within the hopper structure may be divided into two or more storage bins or chambers by upright division walls **36**, one of which is shown in the embodiment illustrated. The storage bins are adapted to be filled with finely divided or granular materials or the like through hatch openings **32***a* formed in the top wall **32** beneath corresponding openings in the roof **24** which are normally closed by the removable hatch covers **37**.

The storage bin structure is provided at its bottom with a plurality of funnel-shaped hopper portions **40** which are adapted to discharge the contents of the storage bins through their lower openings **40***a*. The hopper portions **40** are of rectangular horizontal cross section and are arranged in pairs transversely of the car and in two rows extending longitudinally of the car. The discharge openings **40***a* of each transverse pair of hopper portions are adapted to discharge into a single discharge chute or channel **41** which extends transversely of the car and which is normally closed at its ends by hinged doors **42**. Each chute or housing **41** contains a suction conduit **43** into which the material falling from the adjacent hoppers is deflected by plates **44** of V-shaped cross section so that, upon opening one of the doors **42** and connecting the conduit to a suction line, the contents of the storage bin above the oppositely disposed hoppers may be withdrawn by suction. Other methods and constructions for effecting the discharge may be employed if desired.

Except at the ends of the storage bin structure, each hopper portion **40** is formed by two inclined end plates **45** and by two inclined side plates **46** and **47**, as shown particularly in Figs. 3 and 12. The plates **45**, **46** and **47** converge downwardly to a rectangular opening **40***a*. The endmost hopper portions of the series are bounded on their end walls toward the ends of the car by inclined plates **45***a* which are continuations of the plates **35** previously referred to. The upper edges of the plates **45** are bent into vertical planes and are welded or otherwise united with transversely extending division plates **48** which extend transversely of the car with their ends united with the side walls **31**. The inner inclined plates **46** of the hopper portions **40** have their upper edges directed into vertical planes and these parts are welded or otherwise secured to the central longitudinal division plate **49** which extends throughout the length of the car and which has its ends welded or otherwise secured to the inclined end walls **35**. At the points where the chamber of the hopper car is to be divided into separate storage bins, the transversely extending division plate **48** is extended upwardly to form a division wall **36**, which extends upwardly to the top wall **32** as shown in Fig. 3. Thus, in the embodiment illustrated, the division wall **50** divides the storage bin structure to provide two separate storage bins **51** each having a plurality of funnel-shaped hopper bottom portions through which the contents are discharged. At the points where the walls **45**, **46** and **47** of the hopper bottoms are united with the vertical division plates **48** and **49**, angular corner plates **52** are welded to the inner surfaces of the contacting parts to reinforce the structure and to provide smooth surfaces over which the finely divided or granular materials may flow freely during the operation of emptying the storage bin.

The storage bin structure **30** is preferably formed as a complete unit with its walls secured together as described above before moving this hopper structure into assembled relationship with the supporting structure **55** which is shown particularly in Figs. 1 and 5 to 12, inclusive. This supporting structure comprises a plurality of parallel metal plates **56** lying in vertical planes and extending transversely of the car with their ends welded or otherwise secured to the vertical side frame members **19** through intermediate angle brackets **57**, as illustrated particularly in Figs. 10 and 11. Each transverse plate **56** has seated upon the upper edge thereof a saddle-like supporting member **58**, each having a horizontal top portion **58***a* and two downwardly diverging side portions **58***b*. The top portion **58***a* is welded to the top edge of the member **56** associated therewith and, at the points where the members **58** engage the upright side frame members **19**, each member **58** has superimposed thereon a reinforcing member **59** of similar shape which is comparatively narrow and which is welded to the member **58** and also to the adjacent member **19**.

The transversely extending supporting units comprising the parts **56**, **58** and **59** are connected at their middle points to other supporting members extending longitudinally of the car and comprising a series of plates **60** which are located in vertical planes and which have mounted upon the upper edges thereof the saddle-like supporting members **61** each made up of a horizontal top portion **61***a* and downwardly diverging side portions **61***b*. The top portion **61***a* of each saddle-like member **61** is welded to the underlying plate **60** and the top portion **61***a* of the several saddle-like members **61** are located in the same horizontal planes as the top portions **58***a* of the transversely extending members **58**. At points between the ends of the car, the edges of the members **60** and **61** are shaped to conform to the surfaces of the members **58***b* and two members **60** and **61** are located in the space between each pair of transverse members **58** and are united therewith by welds extending along the surfaces of contact. At the ends of the supporting structure, the members **60** and **61** are increased in length and at the extremities of these longer members **60** they are welded to extension plates **62** which in turn are welded to supporting brackets **63** arranged to be secured by rivets **64** to the body bolsters **17**.

In this way, there is provided a unitary supporting structure carried by the frame of the car having a plurality of spaces or pockets **65** located between the saddle-like members **58** and on opposite sides of the longitudinal saddle-like members **61**, which are adapted to receive the funnel-shaped hopper portions **40**. The inclination of the side walls **58***b* of the members **58** conforms to the slope of the inclined walls **45** of the hopper bottoms so that the members **58** form saddle-like supports for the hopper bottoms as illustrated in Fig. 3. Similarly, the side walls **61***b* of the saddle-like members **61**, which extend longitudinally of the car, conform to the slopes of the members **46** which form the inner boundaries of the hoppers which are arranged in a pair extending transversely of the car so that these side walls **61***b* contact with the surfaces of the plates **46** of adjacent hoppers. According to the preferred practice, after the storage bin structure has been formed as a complete unit it is moved bodily into assembled relationship with the supporting structure **55**, which will have also been formed as a complete unit, and these parts are then secured together by welding the flanges **58***b* of the members **58** to the hopper walls **45** and by welding the flanges **61***b* of the members **61** to the walls **46** of adjacent hoppers. When these parts have thus been assembled and secured together, the assembled storage bin structure and its supporting structure are moved as a unit into the space within the upright frame structure, the roof of the car being then removed and, after the assembled storage bin and supporting structures have been lowered to their proper positions, the ends of the members **56** and **58** are connected to the upright frame members **19**, as previously described, and the extremities of the endmost members **60** are secured to the members **62** and **63** as heretofore described.

When the assembly of the storage bin structure and its supporting structure on the car framework is made, the hoppers **40** and the transverse members **48** are further supported by connecting the plates **56** to the cross bearers

21 which extend between the side sills 18. This connection is illustrated particularly in Figs. 3, 4 and 6 where the members 56 are shown as having their body portions located in the same vertical planes as the cross bearers 21 with their lower edges offset laterally as shown at 56a to provide flanges which overlap the top edges of the members 21. These overlapping parts are then welded together to provide a rigid support for the members 56 on the underframe of the car. In this way all parts of the intermediate frame structure are supported firmly on the underframe of the car regardless of the elevation of different portions of the underframe, and independently of the longitudinal center sill. When the parts are assembled on the car frame, additional support for the inclined end walls 35 of the hopper structure may be provided by members 67 which are secured to the bolsters 17 and which have their inner ends upturned and welded to the end walls 35 through intervening brackets 68, as illustrated particularly in Figs. 1 and 3.

After the hopper structure 30 and its supporting structure 55 have been assembled with respect to the car frame structure, the roof 24 and the runway 25, with the hatchways 37, may be put into place and the roof connected in the usual manner to the upper ends of the upright side frame members 19. By means of the present invention, a novel and convenient method is provided for forming and assembling a hopper car or storage bin wherein a storage bin structure having one or a plurality of storage bins or chambers and a plurality of separate discharge hoppers may be constructed and brought into assembled relationship. By the use of the supporting plates and saddle-like supporting members extending both longitudinally and transversely of the car, adequate support is provided for the storage bin structure throughout its length and width, while at the same time facilitating the assembly of the individual parts of the structure as separate units before they are brought together and insuring adequate support on the underframe to which welded connections are made at the contacting points after the assembly has been effected. By this arrangement, the discharge of the contents of each storage bin is also made highly efficient, since the contents of each bin are discharged through a plurality of separate hoppers distributed throughout its area and separated from each other by vertical division plates and by inclined hopper walls having relatively steep slopes, causing the material to move readily toward the discharge chutes 41. The inclinations of the plates 45, 46 and 47 are preferably substantially greater than the angle of repose of the material to be stored and shipped so that there is no tendency for the material to adhere to these walls when it is desired to unload the cargo and the unloading apparatus has been put in operation.

Although one form of the invention has been shown and described by way of illustration, it will be understood that it may be constructed in various other embodiments which come within the scope of the appended claims.

I claim:

1. The combination in a hopper car having a frame including a center sill, of a material storage bin having a bottom provided with a plurality of funnel-shaped hoppers each having a discharge opening, and a unitary supporting structure carried by said frame but independent of said center sill and having spaced connected members forming openings into which said hoppers extend.

2. The combination in a hopper car, of a frame structure including a center sill, a material storage bin having a bottom formed with a plurality of funnel-shaped hoppers, and a unitary intermediate supporting structure extending throughout the area of said bin and having pockets into which said hoppers extend, said supporting structure being carried by said frame structure independently of said center sill.

3. The combination in a hopper car, of a car underframe comprising a center sill and a plurality of transverse upright frame members, an intermediate supporting structure comprising depending supporting members secured to said frame members independently of said center sill and extending longitudinally and transversely of the car with openings therebetween, and a storage bin having a bottom formed with a plurality of funnel-shaped depending hoppers each extending into one of said openings, said supporting members being separate from but shaped to conform to the contour of said hoppers and being welded thereto.

4. The combination in a hopper car comprising a frame including a center sill, of a storage bin having a bottom formed with a plurality of downwardly extending funnel-shaped hoppers arranged in longitudinal and transverse rows, a plurality of longitudinal and transverse plates carried by said frame independently of said center sill extending in vertical planes between said hoppers, and a plurality of saddle-like supporting members secured to said plates and contacting said hoppers which are on opposite sides thereof.

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