

Feb. 6, 1951

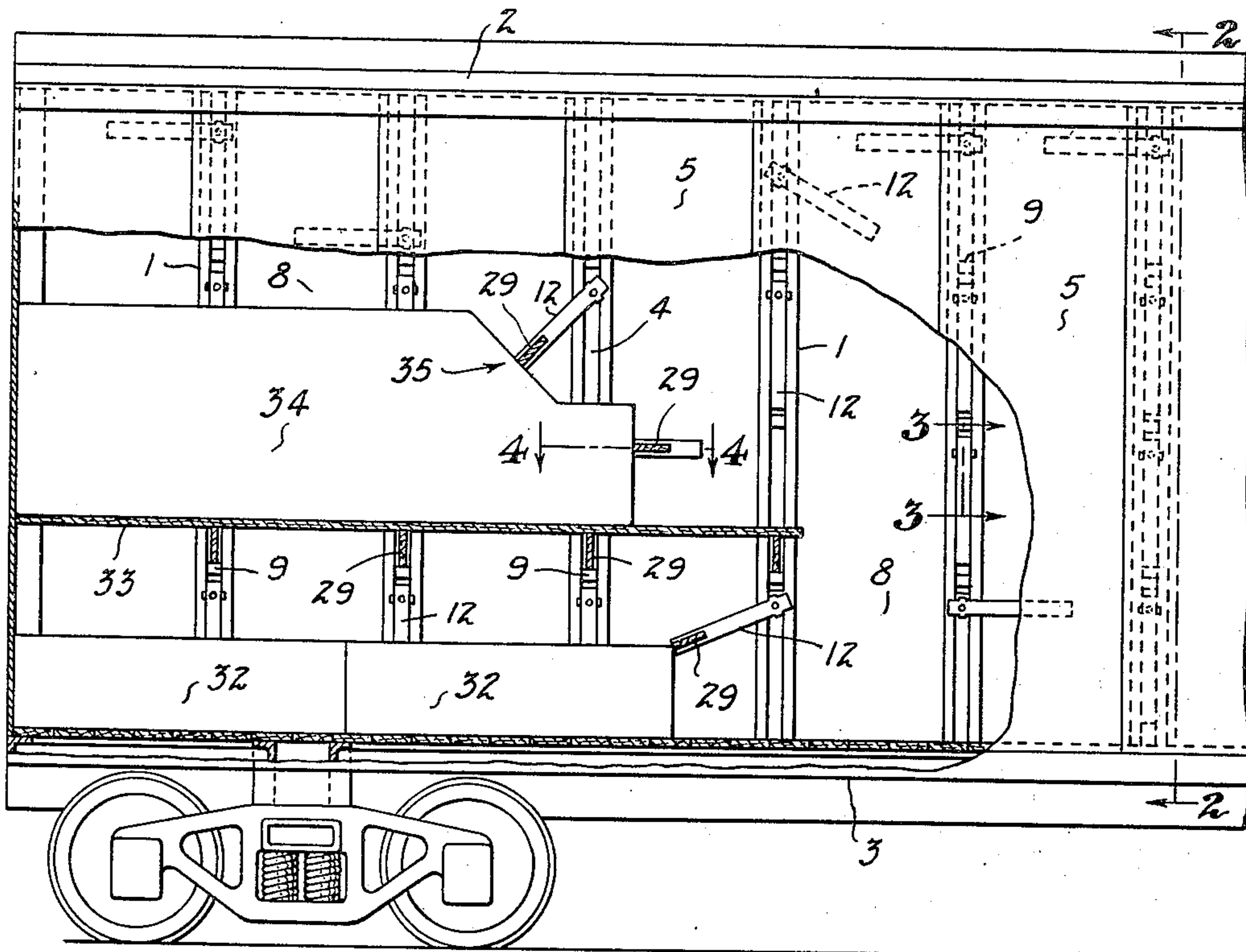
E. G. MANGELS

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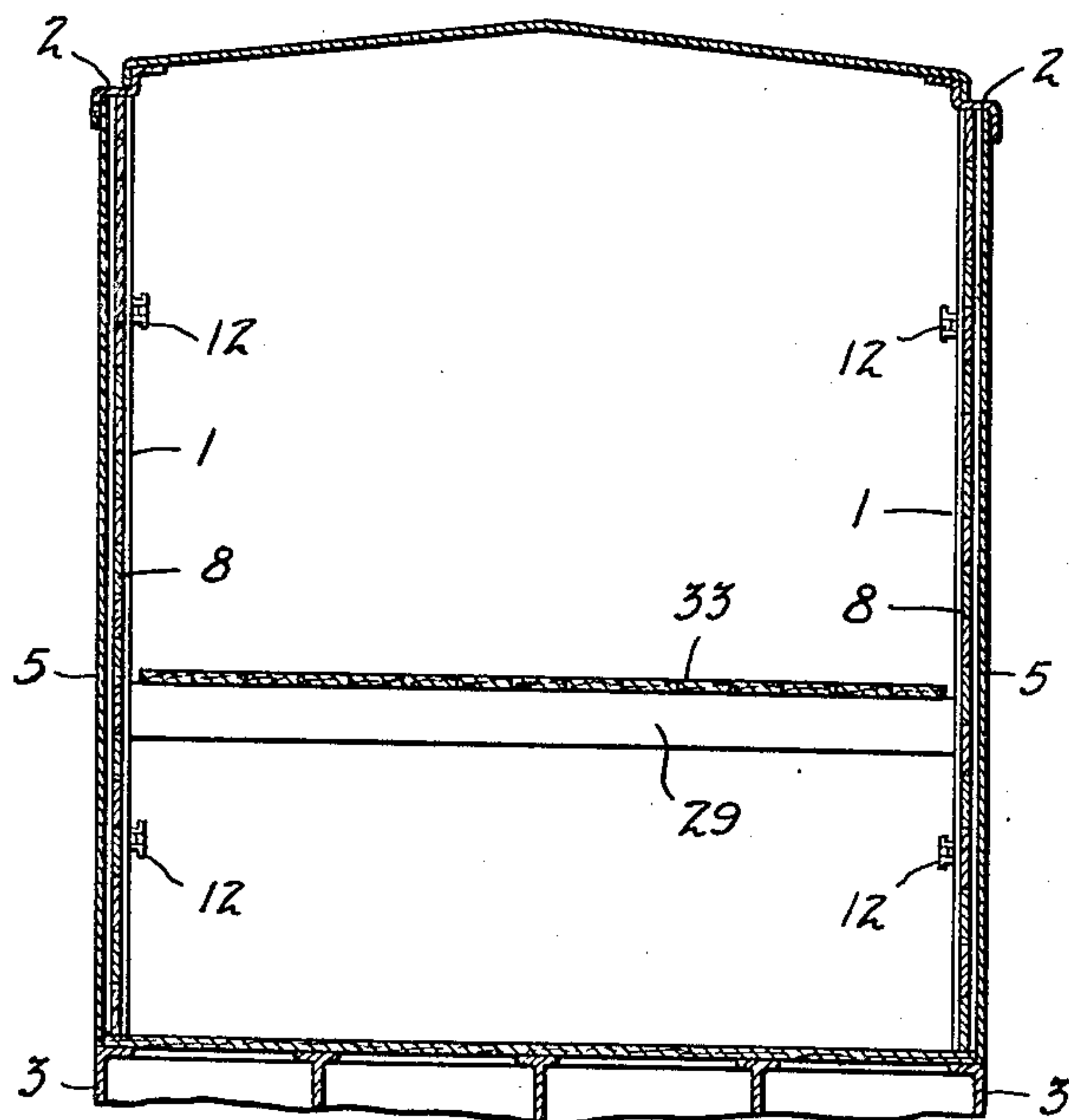
LOAD BRACING APPARATUS

Filed Sept. 13, 1947

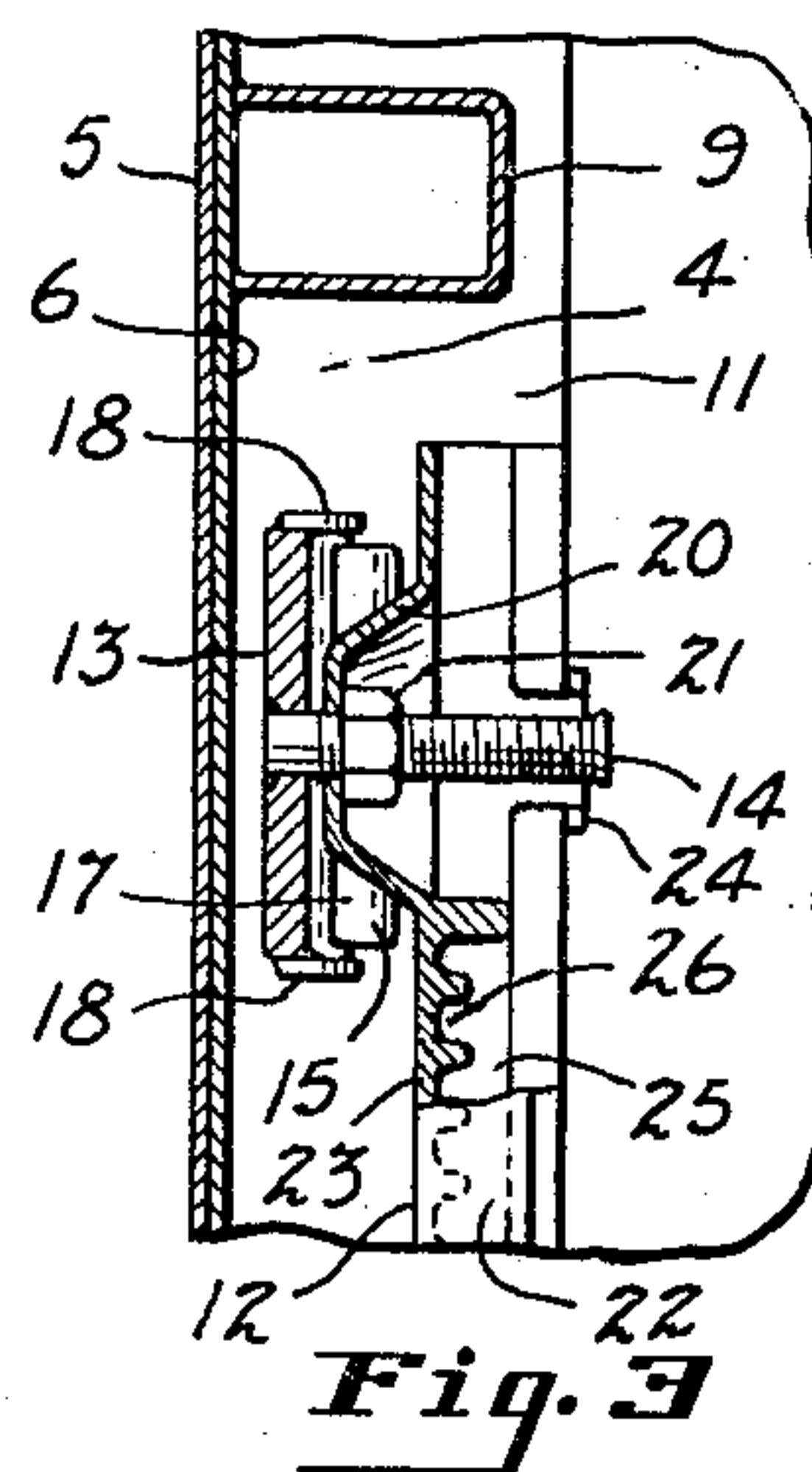
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**Fig. 1**



**Fig. 2**



**Fig. 3**

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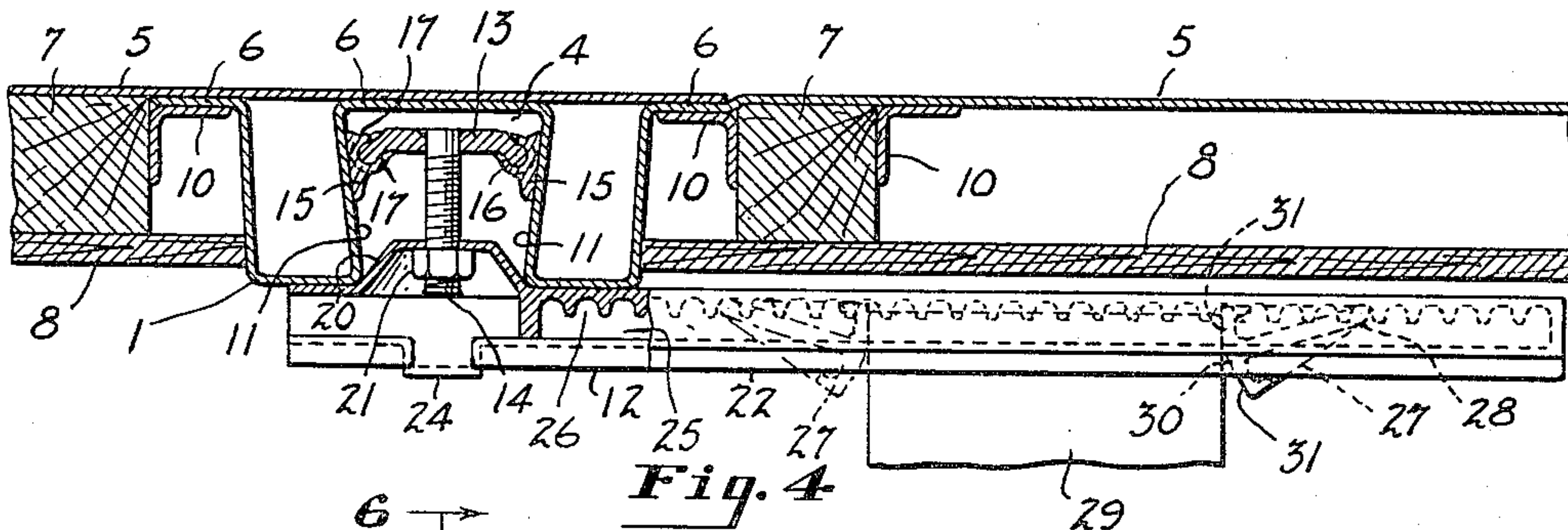


Fig. 4

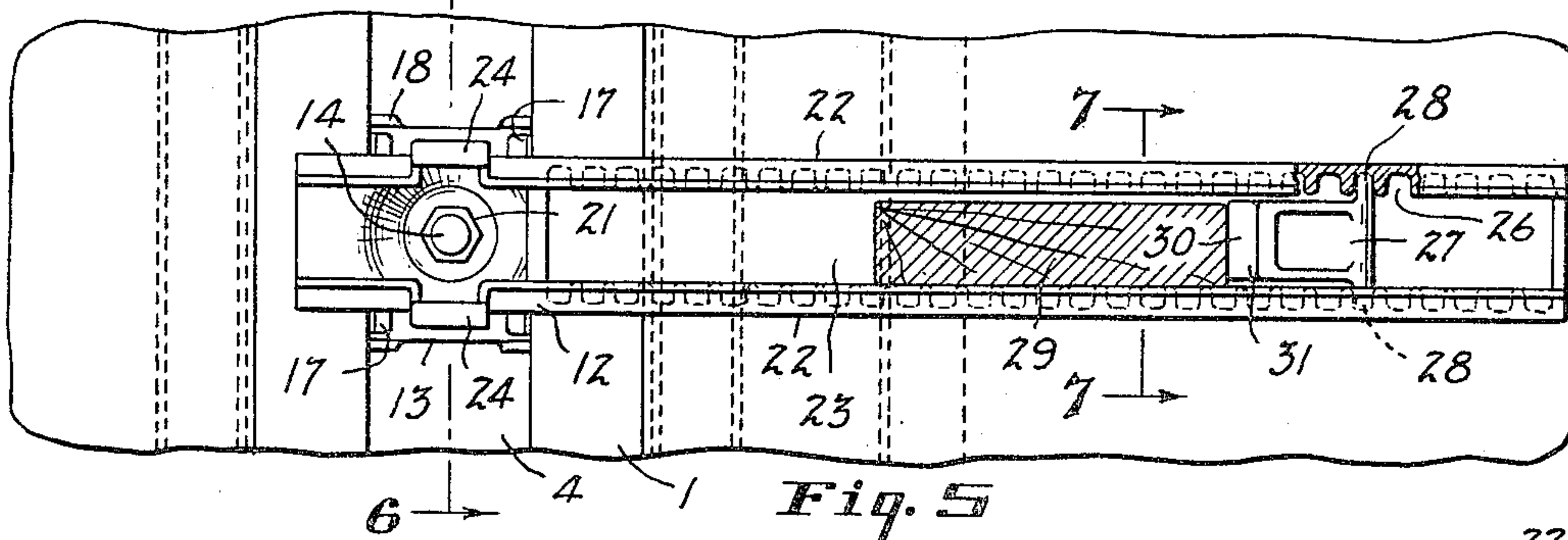


Fig. 5

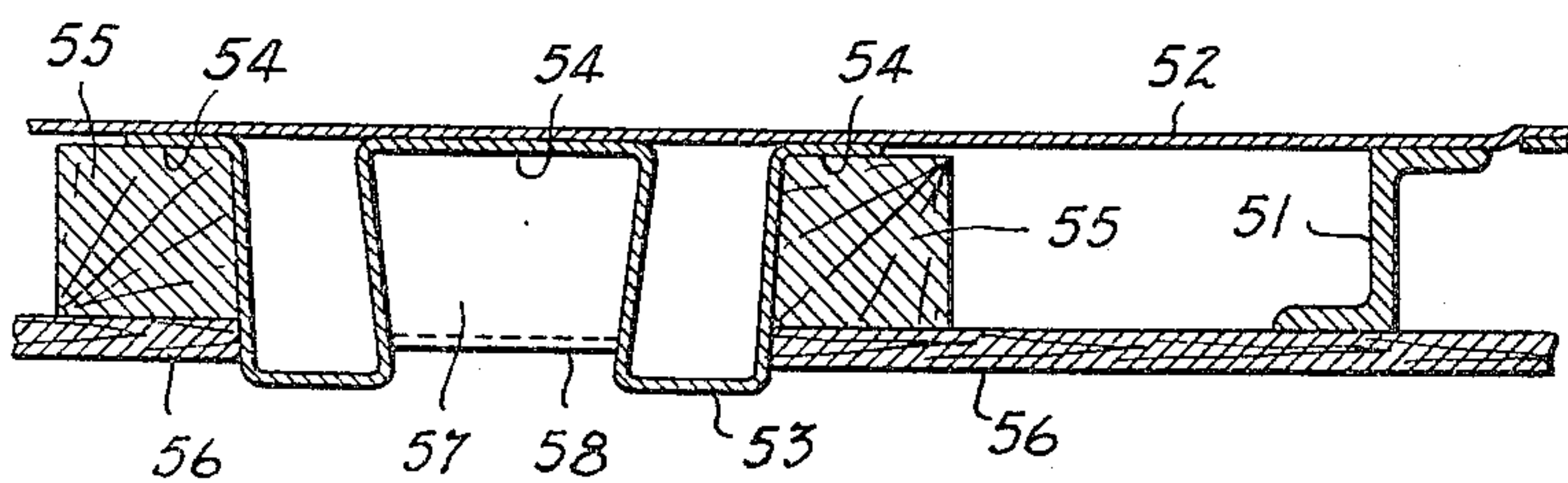


Fig. 9

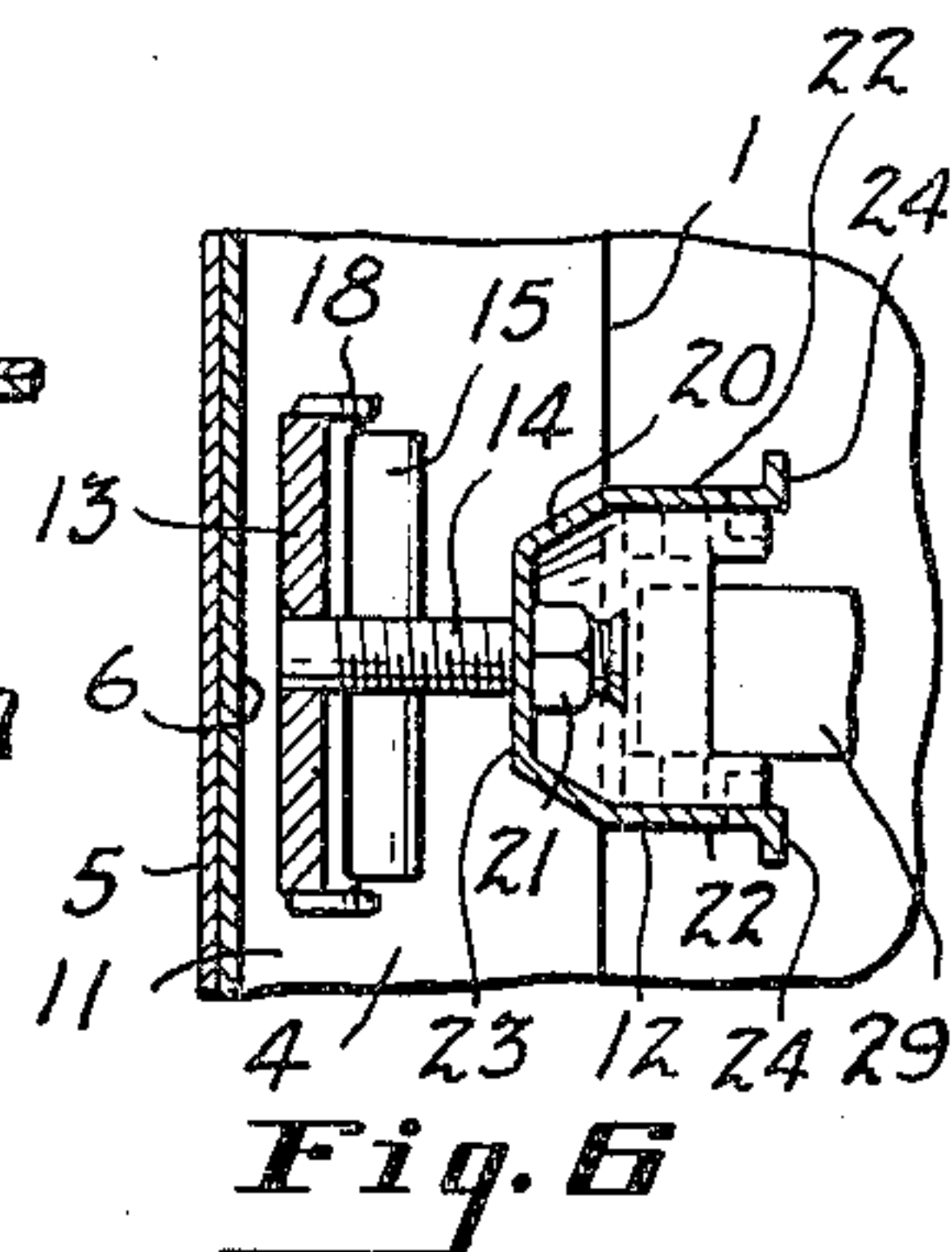


Fig. 6

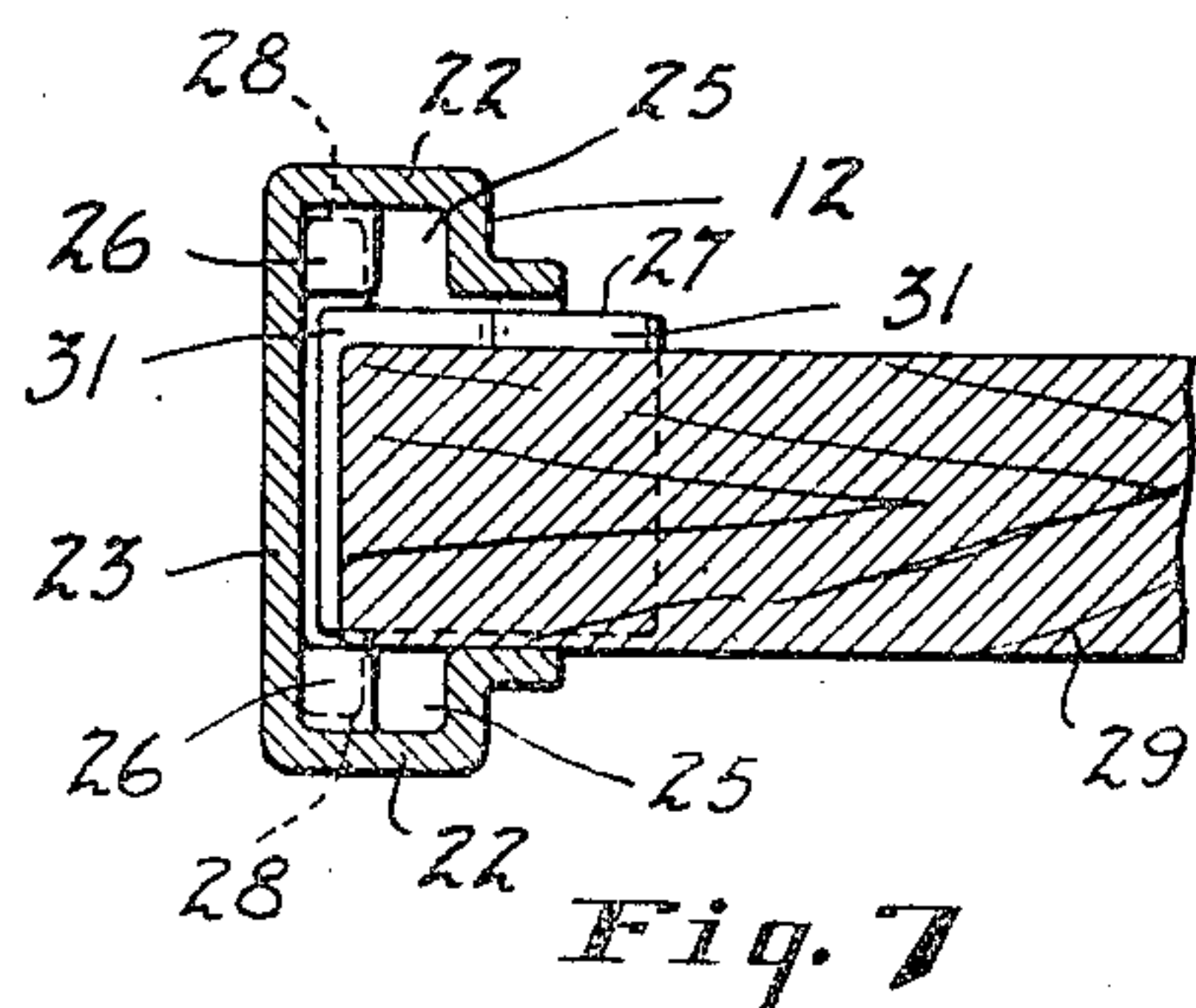


Fig. 7

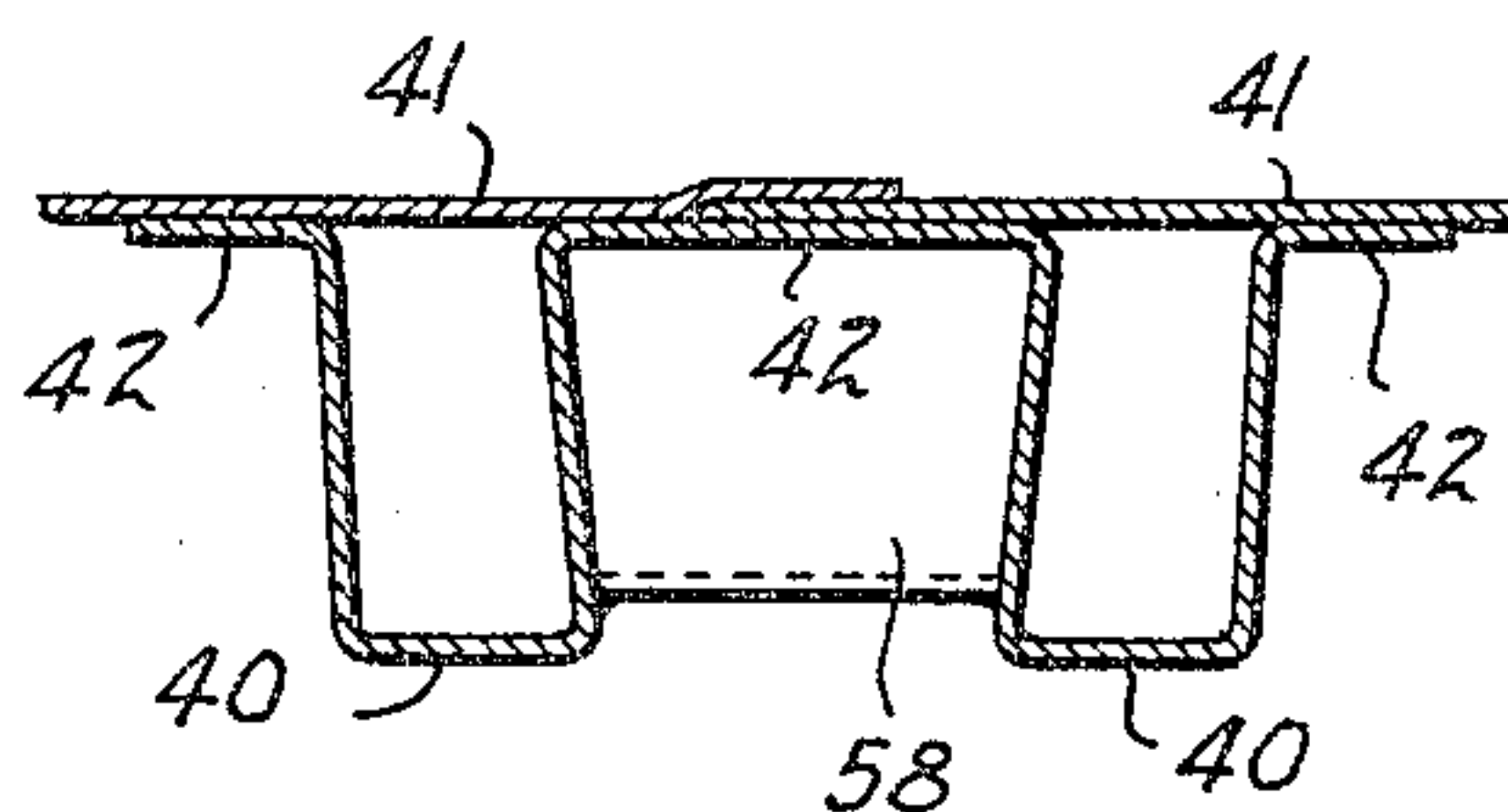


Fig. 8

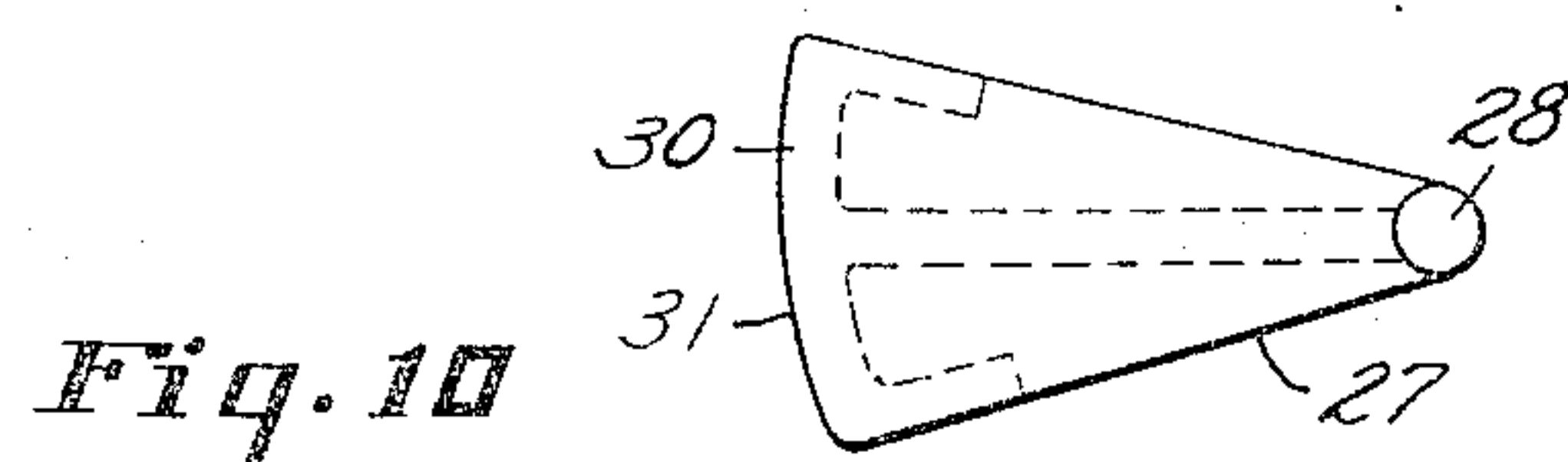


Fig. 10

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## UNITED STATES PATENT OFFICE

2,540,207

## LOAD BRACING APPARATUS

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Application September 13, 1947, Serial No. 773,809

11 Claims. (Cl. 105—369)

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This invention relates to apparatus for bracing the load of railway freight cars or the like. Apparatus of this type is known in the trade as utility loading apparatus.

It is an object of the present invention to provide apparatus for bracing a load which is characterized by its adaptability for use in bracing a large variety of sizes and shapes of loads without requiring the fabrication of a large number of bracing members of the proper size for each application.

Present day utility loading or adjustable car bracing mechanisms are objectionable in that they require the use of special bracing members having permanent attachments carried thereby and require that a complete set of bracing members with their special attachments be carried in the car at all times. This apparatus is often very heavy and in some instances adds as much as one-third or more to the weight of the car when empty, thus substantially reducing the pay load that can be carried when the car is so equipped. It is therefore an object of the present invention to provide an apparatus for adjustably bracing the load which does not require carrying a large supply of heavy bracing members. The apparatus of the present invention is constructed so that the fixtures for supporting the bracing members are built into the construction of the car and it is possible to utilize ordinary bracing members of dunnage lumber available at the point where the car is loaded.

Another object is to provide apparatus for bracing loads which will not interfere with normal use of the car in the event that the character of the load does not require bracing apparatus.

A further object is to provide utility loading apparatus in which all parts of the apparatus are permanently attached to the car so that the movable parts thereof cannot become detached from the car and thereby be lost.

A still further object of the present invention is to provide apparatus for bracing a load of a railway box car or the like in which the apparatus is constructed as a part of the side wall structure of the car so that the apparatus when not in use can be carried within the car side wall without hindering free use of the car.

Other objects and advantages of the present invention will become apparent from the following detailed description accompanied by the drawings, in which:

Figure 1 is a side elevational view with parts broken away of a portion of a railway box car embodying the present invention;

Fig. 2 is an elevational sectional view taken substantially on line 2—2 of Fig. 1;

Fig. 3 is an enlarged fragmentary sectional

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view of a portion of the load bracing apparatus taken substantially on line 3—3 of Fig. 1;

Fig. 4 is an enlarged horizontal fragmentary sectional view showing further details of the bracing apparatus and taken substantially on line 4—4 of Fig. 1;

Fig. 5 is a similar enlarged fragmentary sectional view showing in side elevation the portion of the apparatus shown in Fig. 4;

Fig. 6 is a fragmentary sectional view taken substantially on line 6—6 of Fig. 5;

Fig. 7 is an enlarged fragmentary sectional view taken substantially on line 7—7 of Fig. 5;

Fig. 8 is a fragmentary sectional view of a modified form of car side construction;

Fig. 9 is an enlarged fragmentary sectional view showing in horizontal section how the present invention may be applied to existing railway freight cars; and

Fig. 10 is a plan view of the brace locking member.

The present invention is shown in combination with an improved car side construction which is more particularly described and claimed in my co-pending application, Serial No. 773,808 filed September 13, 1947, entitled Car Side Construction and Load Bracing Apparatus.

The preferred form of car side construction shown in the drawings with which the present invention may be utilized comprises side post members 1 longitudinally spaced along the two opposed car side walls and extending vertically between side plate 2 at the top of the car and side sill 3 at the bottom of the car. These side post members preferably have a multiple channel configuration in cross section with at least one channel facing the interior of the car to provide a vertical recess 4 opening into the interior of the car. The outer car wall may be formed from suitable sheathing panels 5 which may overlap in the region of the side post members. The side post members 1 may be provided with flange portions 6 which lie adjacent the sheathing panels 5 and afford relatively wide contact areas for secure attachment of the sheathing panels to the side post members.

As may best be seen in Fig. 4, the side post members may be integrally formed along one vertical side edge of each of the sheathing panels 5. The opposite side edge of the adjacent sheathing panel may then overlap the side post member and be secured thereto. In combination with the multiple channel side post construction, the overlapped sheathing panel forms enclosed tubular column members which provide a very sturdy and rigid car side construction highly resistant to forces tending to bulge the car side outwardly. The sheathing panels 5 and side post members 1 provide the strength bearing members of the side wall construction.



Suitable furring or nailing strips 7 may be provided to which may be secured a lining 8 forming a smooth interior surface of the car side wall. Preferably the lining 8 is disposed so that it is substantially flush with the inner extent of the side post members 1 so that a continuous smooth faced wall is provided. To hold the nailing strips 7 in place, angle bars 10 may be secured to the sheathing panels 5 or the side post members 1 in any suitable manner and the nailing strips 7 may be secured to the angle bars 10 by bolts or screws. If desired, side post members 1 may be further stiffened and strengthened by the use of suitable stiffening elements 9 which may comprise channel shaped members disposed transversely within the vertical recesses 4 at suitable intervals and secured to side walls 11 of the recesses 4 by welding or the like.

A preferred form of the vertical recesses 4 may be seen in Fig. 4 in which the side walls 11 of the recess converge toward the interior of the car for a purpose to be explained presently. It is to be understood that although a preferred form of side wall construction is illustrated in the drawings, a railway car embodying the present load bracing apparatus may be constructed in any desired manner to provide the plurality of vertical recesses disposed at opposite longitudinal points along the car side and opening into the interior of the car.

Each of the recesses 4 carries one or more arms 12 which are mounted for vertical movement along the recess and also for rotary movement about a point near one end of the arm so that the arm may be disposed at any desired angularity with respect to the recess at any vertical point along the recess. The drawings illustrate one desirable method of mounting the arms 12 to achieve this movement.

A clamping member 13 is disposed within the recess 4 and has a stud or bolt 14 projecting from the face of the clamping member centrally of the recess and toward the interior of the car. At either or both sides of the clamping member 14, friction clamping shoes 15 may be mounted for limited pivotal movement. In the form of the invention shown in the drawings the clamping member terminates in angularly disposed cylindrical surfaces 16 which may be embraced by complementary shaped surfaces lying between arms 17 of the friction shoes 15. To hold the friction shoes 15 to the clamping member 13, the top and bottom ends of the clamping members 13 may be provided with headed portions, indicated by the numeral 18.

The arm 12 is provided with a frusto-conical projection 20, the diameter at the base of the frusto-conical projection being approximately the width of the opening of the recess 4 and the top of the frusto-conical projection being apertured to receive the bolt or stud 14. Thus, when it is desired to lock the arm 12 at any desired vertical point, nut 21 is tightened, drawing the clamping member 13 and the friction shoes 15 toward the mouth of the converging recess along the side walls 11. The arm 12, having portions lying across and extending beyond the mouth of the recess 4, resists being pulled into the recess and a secured clamping action is provided. This position is shown best in Fig. 6.

The arm 12 is a channel shaped member having side portions 22 and a connecting base portion or bottom wall 23 from which the frusto-conical projection 20 extends. The width of the arm 12, except for enlarged flange portions 24

on the channel sides 22, is less than the width of the mouth of the recess 4 so that in either its upward or downward vertical position the arm 12 may be substantially entirely disposed within the recess 4 and by further tightening of the nut 21 the arm may be clamped within the recess. In this position, illustrated in Fig. 3, the only portion of the load supporting apparatus projecting beyond the interior surface of the side wall are the flange portions 24 of the channel legs 22, so that when the arms 12 are not in use they may be stored within the car side wall where they do not interfere with the normal use of the car. Each of the channel legs 22 of the arms 12 is provided with a longitudinally extending recessed portion 25 and extending along this recessed portion in the region of the bottom wall 23 are a plurality of notches 26 which open to the recessed portion 25. Mounted for sliding movement along the recess 25 between the channel legs 22 is a locking member 27 having outwardly extending pins 28 which may be adjustably positioned in the notches 26 or may be withdrawn from the notches 26 and moved along the recess 25 to a desired position. The channel legs 22 of the arm 12 are spaced apart sufficient to receive the end of suitable transverse bracing member 29. The purpose of the locking member 27 is to hold an end of the transverse bracing member 29 in contact with a portion of the load so that it will restrain shifting of the load while the car is in movement, and for this purpose the locking member is provided with a head 30 having wedge or cam surfaces 31 thereon which permit the locking member to be used in either direction.

In operation the load to be braced is placed in the car and the desired number of arms 12 are positioned in approximately the correct location for bracing the load. The transverse bracing members are positioned in contact with the load with their ends disposed between the channel legs 22 of two opposite arms 12 and the locking member 27 is moved along the arm until the wedge surface 31 contacts the bracing member 29. The pins 28 of the locking member may then be inserted in the next closest notch 26 and by applying pressure to the head 30, the wedge or cam surfaces 31 are used to tightly wedge the locking member 27 so that it will hold the bracing member 29 firmly against the load.

As may be seen in Fig. 1, each of the railway car sides at opposite points therealong is provided with a number of the vertical recesses 4 in which are mounted a plurality of fixed and a plurality of adjustable means for supporting transverse bracing members. The fixed supporting means are provided by the stiffening elements 9 and the adjustable supporting means are provided by the rotatable arms 12 and their associated mechanism. The fixed supporting means are disposed within the car side wall construction and the adjustable supporting means may be locked in a position within the car wall when it is desired to utilize the car without the load bracing apparatus.

Fig. 1 illustrates several applications of the present invention embracing the load of a railway box car. The numeral 32 indicates objects disposed on the floor of the car and held in place by a transverse bracing member 29 supported at each of its ends by one of the arms 12. The numeral 33 indicates a removable floor or deck supported by a plurality of transverse bracing members 29, which in turn are supported at their



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ends by a plurality of the fixed supports 9 disposed at the same vertical height in several adjacent recesses 4. Such a deck or floor 33 is useful to tier the car so that it may carry objects at separated vertical heights. The numeral 34 indicates a large object carried by the floor 33. The object 34 is held in place by a transverse bracing member 29 supported in position by a pair of the arms 12. An additional bracing member is locked into place against an angular surface of the object 34 as indicated at 35 to more firmly hold the object in place.

Fig. 8 illustrates a modified form of side wall construction utilizing side post members 40 which are similar to those shown in Figs. 1 through 7 except that the side post members 40 are not integrally formed with the sheathing panels. Instead sheathing panels 41 are provided and it is preferable that the edges of adjacent sheathing panels meet in a lap joint in the region of the side post members so that the sheathing panels may be secured to each other and to flange portions 42 of the side post members 40.

Fig. 9 illustrates the application of the present invention to existing railway freight cars. When the lining of an existing car becomes worn and is removed for replacement, side post members constructed in accordance with the present invention may be readily installed in the car side wall and will provide a strengthened and stiffened car side wall, while at the same time incorporating the improved load bracing apparatus of the present invention. In Fig. 9 the numeral 51 indicates the conventional Z-section side post which may be found in a large number of existing box cars. Two adjacent sheathing panels 52 meet in a joint in the region of side post 51 and may be secured to such side post member. Unless the sheathing panels are defective they need not be replaced. New side post members 53 constructed in accordance with the present invention may be installed in the car side wall at opposite points along the car side wall and may be secured at their ends to the side plate and the side sill and to the sheathing panels along the flange portions 54 which lie adjacent the sheathing panels. Then new nailing strips or furring 55 may be suitably secured to the side post members 53 and a suitable interior lining 56 nailed to the nailing strips 55 so that the lining will provide an interior car side surface substantially flush with the side post members 53. Thus a plurality of channel shaped recesses 57 opening into the interior of the car are provided in which may be mounted a plurality of stationary transverse bracing member supports 58 and a plurality of the previously described adjustable bracing member supports or rotary arms (not shown). When completed the car is provided with a reinforced car side construction of great strength and stiffness. Further, the car is equipped with load bracing apparatus embodying the present invention.

Utility loading apparatus constructed as previously described provides a highly advantageous means for bracing the wide variety of loads encountered in railway freight cars. The present invention obviates the serious disadvantage encountered in previous mechanisms of this type, namely, the bulk and weight of the removable load bracing attachments which are required to be carried in the car for possible use whether or not they were needed. In the present construction a portion of the apparatus is permanently installed within the car side wall and cannot be removed and thus be lost or misplaced. The

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balance of the load bracing apparatus comprises bracing members which may be of wood and obtained at the site where the loading is to be done. In fact, in the case of the transverse bracing members 29, these may be cut to the proper length and an available supply maintained.

When it is desired to use the car without the apparatus, the apparatus can be locked into the car side wall where it will not interfere with the use of the car. By the use of fixed load bracing supports and the adjustable arms, almost any shape or size of load can be effectively braced, eliminating the time consuming method of cutting and fitting dunnage lumber for each article to be braced. With the present apparatus there is little or no occasion to nail bracing members to the lining or floor of the car wall and accordingly the life of these parts is materially increased.

Load bracing apparatus and car side wall construction embodying the present invention and constructed as shown and described is highly advantageous in affording an exceedingly strong and sturdy side wall construction for railway freight cars. The form of side post member shown in the drawings is of greater longitudinal extent than side post members now in use. This means that the portions of the side plate 2 and the sheathing 5 disposed between adjacent side post members are of less extent and the strength of the walls is increased without increasing the cost and weight of the construction by an increase in the number of side posts. The decreased extent of the side sill portions between adjacent side post members provides a stiffer and stronger car side frame and the decrease in length of sheathing between side post members provides a stiffer car side wall construction with an increased resistance to forces tending to bulge such side walls.

It will be understood that the foregoing description of preferred embodiments of the invention is for the purpose of explanation and illustration and is not intended to limit the scope of the invention as described and claimed in the following claims.

What I claim is:

1. Apparatus for bracing loads of railway freight cars or the like which comprises members defining a pair of vertical recesses at opposite points along the interior of the longitudinal car side walls, said recesses opening into the interior of said car, a plurality of arms pivotally mounted in said recesses, mechanism for holding said pivot points at desired vertical positions along said recesses and for holding said arms in desired angular positions with respect to said recesses, and supporting members adjustably mounted for movement along said arms and adapted to support the ends of transverse bracing members.

2. Apparatus for bracing loads of railway freight cars or the like which comprises members carried by the longitudinally extending car side walls and defining spaced vertical recesses at opposite points therealong, said recesses being open to the interior of the car and narrower at the mouth thereof than at the depth thereof, and a plurality of bracing member supports mounted for movement along said recesses, said supports being radially adjustable with respect to predetermined points along said recesses.

3. Apparatus for bracing loads of railway freight cars or the like which comprises in com-



ination with a pair of opposed car side walls, a plurality of vertical recesses at spaced longitudinal points along said car side and opening to the interior of said car, a rotatable arm mounted for sliding movement along said recess, means for clamping said arm in said recess at a desired vertical position and at the desired radial position, and supporting means adjustably mounted along said arm to support load bracing members.

4. Apparatus for bracing loads of railway freight cars or the like which comprises a plurality of sheathing panels adapted to be overlapped to form an outer car side wall, a plurality of side post members of multiple channel configuration in cross section having at least one channel opening into the interior of said car, each of said side post members being formed integrally with and along a vertical side edge of one of said sheathing panels, and bracing member supports mounted for movement along said channels, said supports being mounted for pivotal movement with respect to predetermined points along said channel and being adjustable along radial lines with respect to said predetermined points.

5. Apparatus for bracing the load of a railway car or the like which comprises in combination with a car side wall, a plurality of side post members, said side post members defining channel shaped vertical recesses open to the interior of said car side wall, a rotatable arm mounted for movement along said recess, means for clamping said arm at desired points along said recess, and means for supporting an end of a transverse bracing member at a plurality of predetermined positions along said arm.

6. Apparatus for bracing loads of railway freight cars or the like which comprises members carried by the longitudinally extending car side walls and defining spaced vertical recesses at opposite points therealong, said recesses being open to the interior of the car, a plurality of arms having frusto-conical projections extending therefrom and into the mouths of said recesses, members mounted for movement along said recesses and having threaded portions passing through apertures in said projections, nuts on said threaded portions adapted to hold said arms against rotation and at desired points along said recesses, and support members adjustably mounted for movement along said arms.

7. Apparatus for bracing loads of railway freight cars or the like which comprises in combination with a pair of opposed car side walls, a plurality of vertical recesses at spaced longitudinal points along said car side and opening to the interior of said car, a rotatable arm mounted for sliding movement along said recess, means for clamping said arm in said recess at a desired vertical position and for clamping said arm at the desired radial position, and supporting means adjustably mounted along said arm to support load bracing members, said recess and said arm being so dimensioned that when said arm is in either of its vertical positions said arm is movable into said recess, and means for clamping said arm while disposed within said recess.

8. Apparatus for bracing the load of railway freight cars or the like which comprises in combination with a pair of opposed car side walls, a plurality of vertical recesses at spaced opposite points along said car side, said recesses opening to the interior of the car, members in said

recesses vertically adjustable therealong, and support members carried by said vertically adjustable members and having brace receiving portions each of said support members being mounted for pivotal movement with respect to one of said vertically adjustable members and adjustable toward and away from said members.

9. Apparatus for bracing the load of railway freight cars or the like which comprises members carried by the longitudinally extending car side walls to define spaced vertical recesses at opposite points therealong, said recesses being open to the interior of the car and narrower at the mouth thereof than at the depth thereof, arms mounted near one of their ends on pivots, said pivots being carried by clamping members disposed in said recesses, means cooperative with said clamping members to lock said arms with respect to said pivots at desired angular positions of the arms and at desired vertical positions along said recesses, and supporting members adjustably mounted for movement along said arms to support bracing members.

10. Apparatus for bracing the load of railway freight cars or the like which comprises members carried by the longitudinally extending car side walls and defining vertical recesses at spaced opposite points along the interior of said car side walls, said recesses opening into the interior of said car, a plurality of arms each mounted near one of its ends on a pivot, said pivots being carried by members disposed in said recesses, locking means cooperable with said members to position said arms on said pivots at desired angular positions of the arms and at desired vertical positions along said recesses, supporting members adjustably mounted for movement along said arms to support load bracing members, said arms and support members being narrower than said recesses to permit insertion of said arms into said recesses in their vertical positions.

11. Apparatus for bracing the load of railway freight cars or the like which comprises a plurality of sheathing panels adapted to be overlapped to form an outer car side wall, a plurality of side post members of multiple channel configuration in cross section having at least one channel opening into the interior of said car, each of said side post members being formed integrally with and along a vertical side edge of one of said sheathing panels, a plurality of arms pivotally mounted on members disposed in said recesses, mechanism for holding said members at desired vertical positions along said recesses and for holding said arms in desired angular positions with respect to said recesses, and bracing member supports adjustably mounted for movement along said arms and capable of supporting the ends of transverse bracing members.

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