

[54] **FREIGHT CONTAINERS FOR FLOWABLE GOODS**

[75] Inventor: **Helmut Gerhard, Weitefeld/Sieg, Germany**

[73] Assignee: **Westerwalder Eisenwerk Gerhard KG, Weitefeld/Sieg, Germany**

[22] Filed: **July 10, 1973**

[21] Appl. No.: **378,021**

[52] U.S. Cl. **222/143, 220/1.5, 220/5 A**

[51] Int. Cl. **B65d 7/44**

[58] Field of Search 222/143, 173, 180, 183, 222/185, 572; 220/DIG. 6, 1 B, 5 A, 1.5

[56] **References Cited**

UNITED STATES PATENTS

3,653,531 4/1972 Zurmuehleli 220/5 A

FOREIGN PATENTS OR APPLICATIONS

2,007,142 2/1970 Germany 222/143

Primary Examiner—Robert B. Reeves

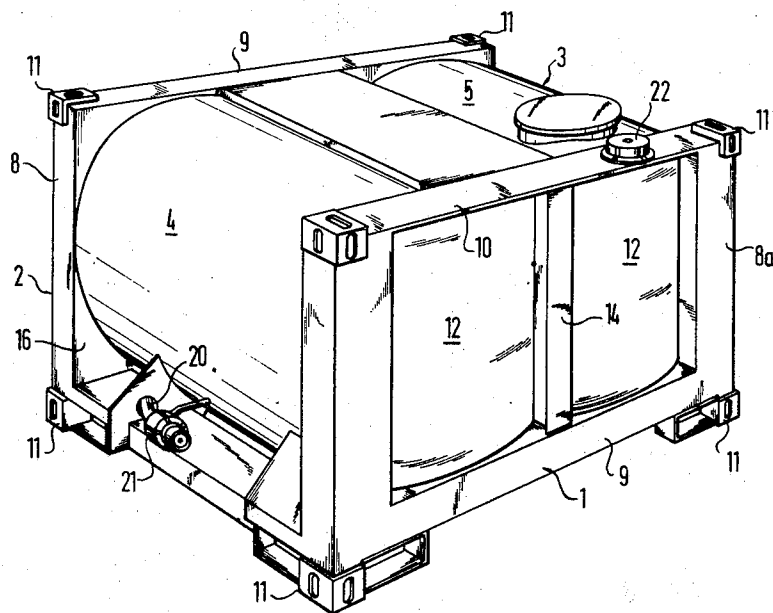
Assistant Examiner—Larry H. Martin

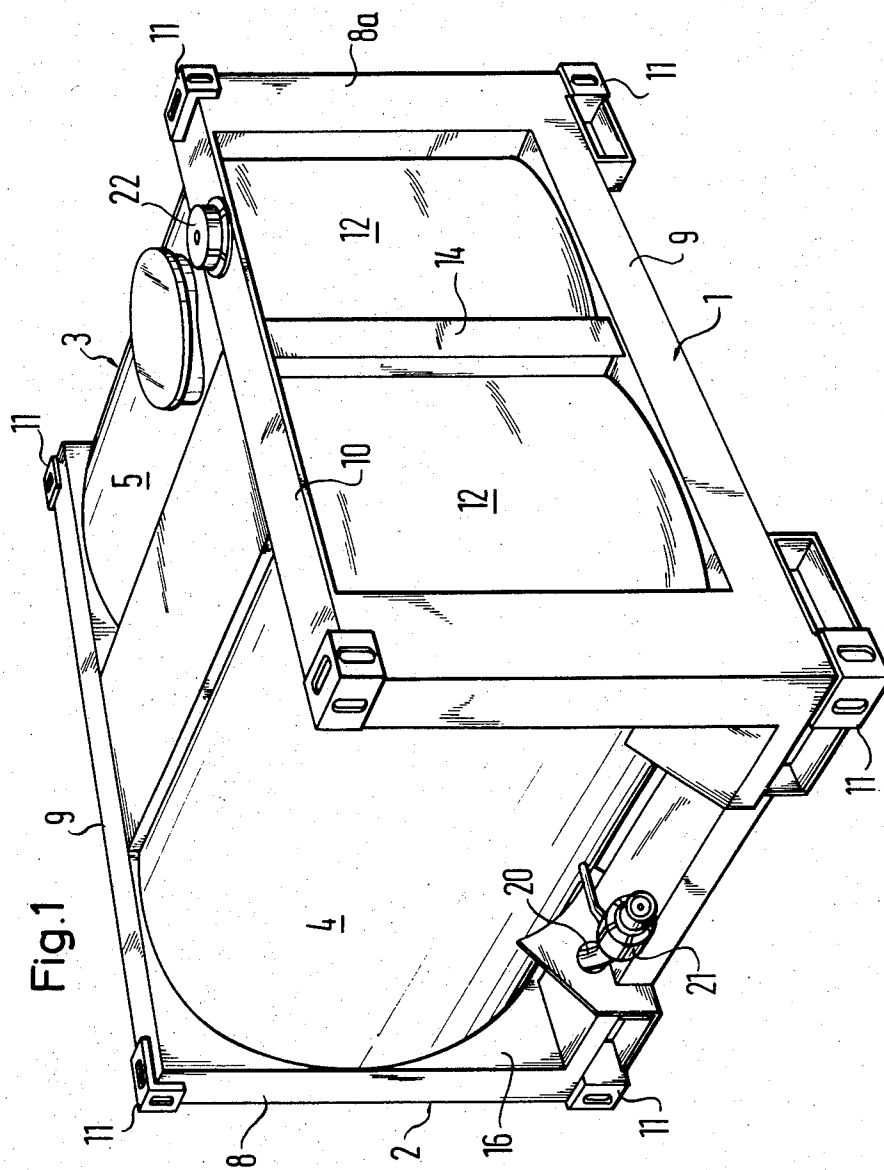
Attorney, Agent, or Firm—Craig & Antonelli

[57] **ABSTRACT**

In a freight container for flowable goods the necessary ducts for interconnecting various compartments of the container so as to enable the contents of these compartments to be discharged completely, are in the form of troughs defined by structural elements of the container walls. This construction simplifies manufacture and facilitates cleaning of the container.

10 Claims, 7 Drawing Figures





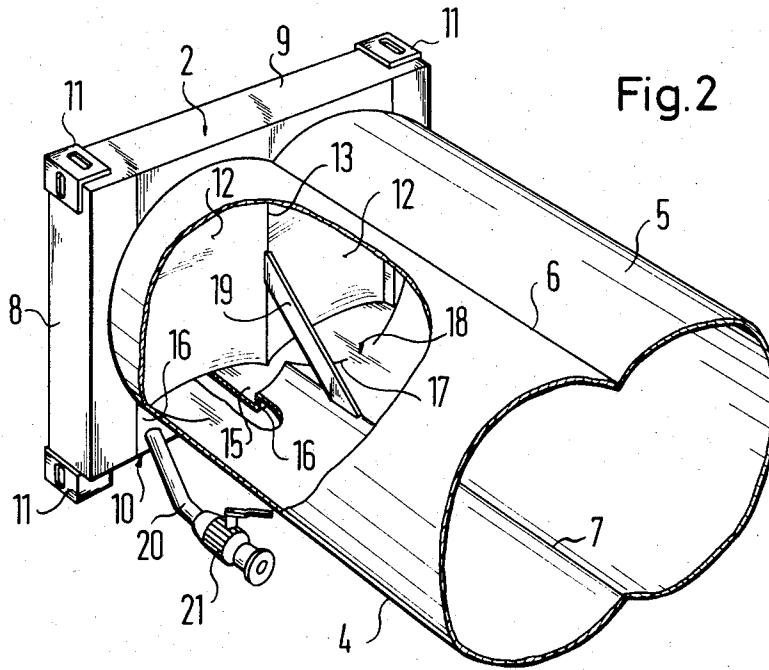
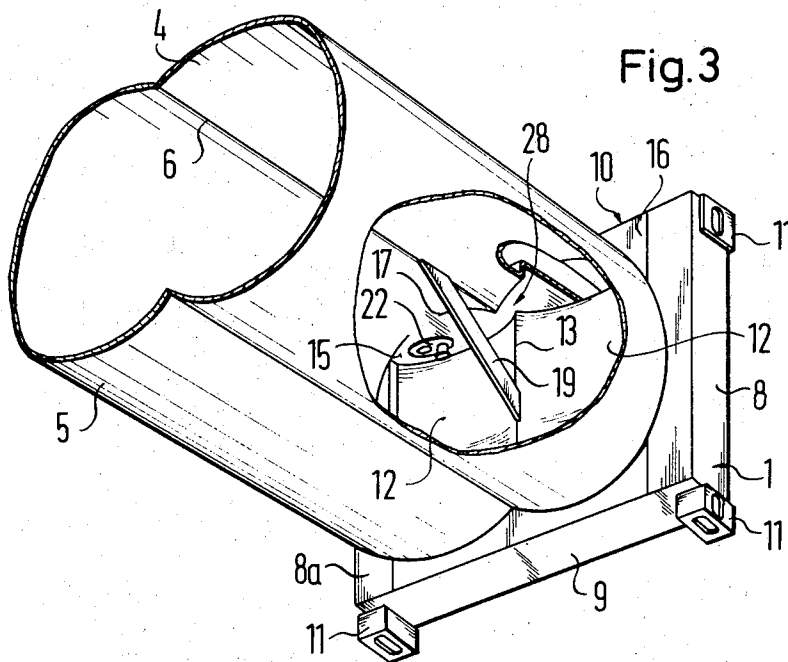


Fig. 4

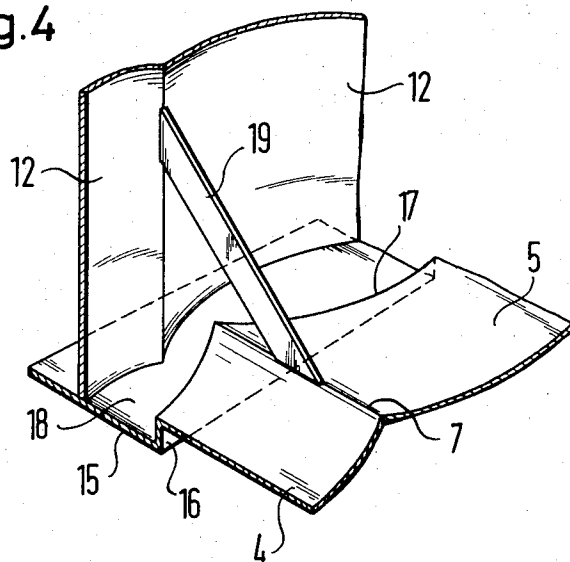


Fig. 5

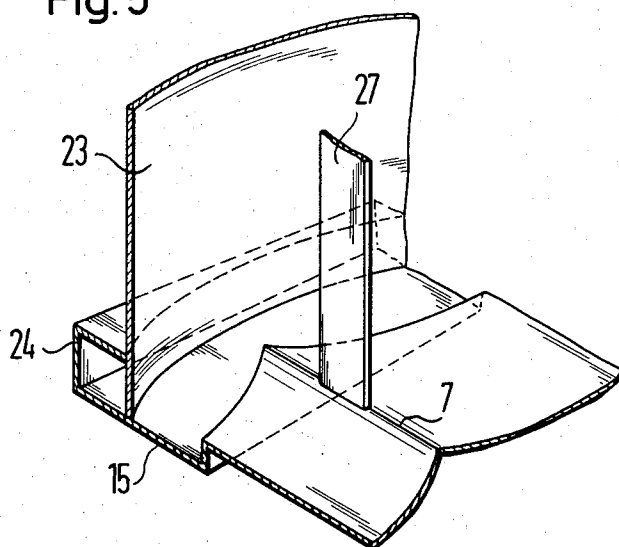


Fig.6

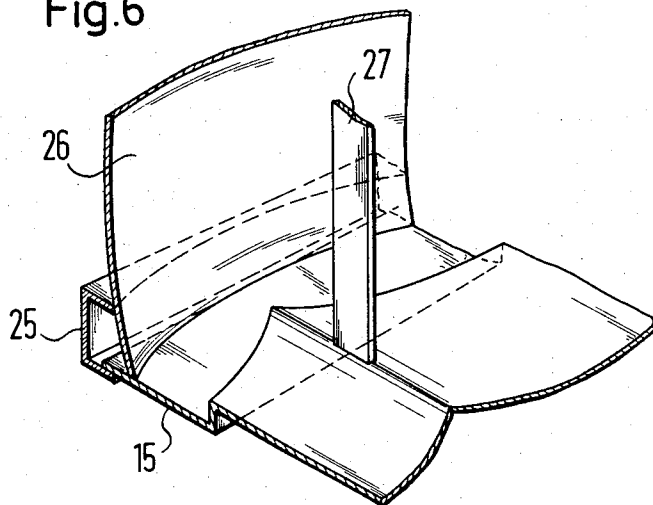
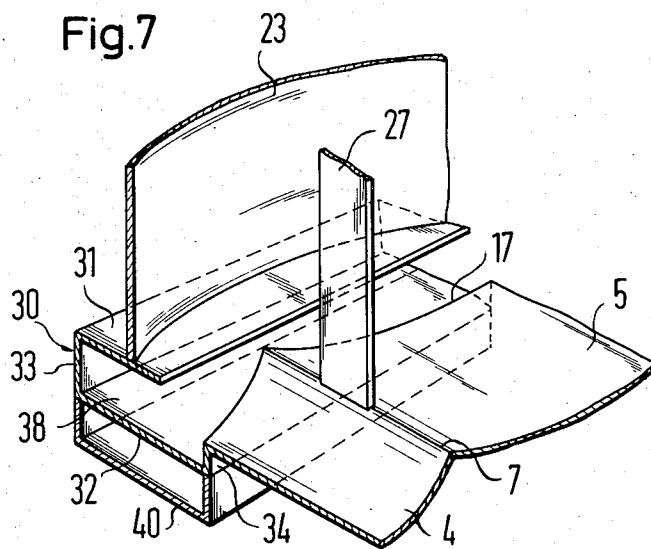


Fig.7



FREIGHT CONTAINERS FOR FLOWABLE GOODS

This invention relates to a freight container for flowable goods with two end walls comprising beams which are joined together to form a frame and curved wall elements inserted into the frame, corner fittings for lifting and stacking of the container attached to the frame and longitudinal walls extending between the end walls and connected therewith fluid-tightly, said longitudinal walls comprising intersecting part-cylindrical wall sections curved about axes which are parallel to the longitudinal container axis, the longitudinal walls having at the floor and/or the top of the container at least one re-entrant saddle portion parallel to the longitudinal container axis and directed into the interior of the container. A freight container of this kind is, for example, disclosed in German Pat. specification No. 2,007,142, and will hereinafter be referred to as "a freight container as hereinbefore specified."

For the purpose of completely emptying a fluid container as hereinbefore specified, it is necessary to connect the various trough lines formed at the floor of the container, which are relatively separated by re-entrant saddle portions parallel to the axis and directed inwardly of the container, with each other and with a discharge device, e.g., a discharge valve. The connecting pipes take up a lot of space and are difficult to clean.

The crown lines of fluid containers (e.g., of dual-pipe construction) which are relatively separated by re-entrant saddle portions also have to be interconnected for the purpose of venting and pressure equalisation. Similarly to the discharge pipe at the floor of the container, the transverse pipe hitherto used for this purpose cannot be cleaned or is difficult to clean.

It might be conceivable to substitute troughs which are open to the interior of the container for the transverse connecting pipes. Such troughs, however, require a lot of bending and welding and pose a considerable problem particularly in the case of pressure-proof fluid containers.

The object of the invention is to simplify the design of the provision of the transverse interconnections in a fluid freight container as hereinbefore specified, for the purpose of discharging and/or venting it, and to reduce the sealing- and strength problems entailed.

According to the invention, in a freight container as hereinbefore specified a horizontal transverse beam of at least one end wall is so constructed as to be open to the interior of the container and together with the end edge of the adjacent longitudinal container wall forms a transversely extending, inwardly open trough, having a depth which is at least equal to the distance between the re-entrant saddle portion and an associated trough- or crown line of the container wall concerned.

Such a trough is not only easy to clean, but also easy to manufacture, since it is already pre-formed in the end wall. Thus no special operation need be performed on the adjacent wall sections of the container for forming the transverse trough.

If the beams forming the frame of the end wall consist of hollow members of rectangular cross-section, the transverse trough may be formed by omitting the portion of the vertical inner wall of a transverse beam which is located inside the container. From the point of view of cleaning, however, it is even more advantageous to omit also the vertical outer wall of the beam

concerned, i.e., to extend the wall elements at the edge of the end wall, which are inserted in the frame, up to the horizontal outer boundary of the terminal wall. For the purpose of protection against extraneous mechanical damage, such a trough may be reinforced by welding thereto additional external sections. This design becomes particularly simple if the elements of the end wall which are inserted in the frame consist of part-cylindrically curved wall elements with vertical axes.

In the case of a container of this kind, comprising two end wall elements adjoining at a vertical centre line for the purpose of increasing the rigidity and pressure resistance, an oblique tie rod bridging the transverse trough may be provided between the re-entrant saddle portion of the floor and that of the top of the container respectively and the vertical centre line of the end wall.

Several forms of freight container embodying the invention will now be described, by way of example only and with reference to the drawings, in which:

FIG. 1 is a perspective representation of a first said form of freight container;

FIG. 2 is a broken inside view of the latter at the side at which a filling- and discharge socket is located;

FIG. 3 is a broken inside view of the freight container at the side at which the equalising trough is located;

FIG. 4 is a fragmentary view of part of FIG. 2; and

FIGS. 5 to 7 are diagrammatic representations of other said forms of freight container.

The freight container for fluids shown in FIGS. 1 to 4 has two end walls 1 and 2 and a main portion extending between these end walls, which in this instance is made up of two part-cylindrically bent wall sections. The adjacent sections 4 and 5 are contiguous at the longitudinally extending re-entrant saddle portions 6 and 7. The re-entrant saddle portion 6 of the top is disposed at a lower level than the crown lines of the adjacent wall elements 5 and 4. Likewise the re-entrant saddle portion 7 of the floor is disposed at a higher level than the trough lines of the adjacent wall elements 4 and 5. The end walls 1 and 2 each have two vertical beams 8 and 8a and two horizontal beams 9 and 10. The beams form a quadrilateral frame having corner fittings 11 for lifting and stacking attached to their corners. Two part-cylindrical wall elements 12 are inserted in the frame in an upright position. The connecting line 13 of the two wall elements is reinforced by an externally mounted T-shaped fillet 14.

Whilst the beams 8, 8a and 9 define hollow members of rectangular cross-section, the beams 10 consist only of a horizontal cover surface 15 and a vertical sheet metal element 16. The wall elements 12 and the fillet 14 extend from the interior of the transverse beam 9, to the interior of the horizontal cover surface 15 and are welded to the latter in fluid-tight manner. The vertical sheet metal element 16 extends to the edge of the wall sections 4 and 5. The ends of the wall sections are cut off straight and butt-welded to the walls of the beams 8, 8a and 9 facing them, whilst the edge of the wall 16 of the beam 10 is matched to the shape of the wall sections. In this way arched edges 17 are formed to which troughs 18 and 28 extending transversely to the longitudinal direction of the container are adjacent. Each of the troughs 18 and 28 is formed by the wall elements 12 and the surfaces 15 and 16 of a transverse beam 10. The floor 15 of this trough is at the same level as the trough- and crown lines of the wall sections 4 and

5, whilst the portion of the trough wall which protrudes further towards the interior of the container corresponds to the re-entrant saddle portion 7 or 6 respectively.

For the purpose of reinforcing the end wall at its side corresponding to the trough, an oblique tie rod 19 is provided between the vertical centre line 13 of the end wall and the re-entrant saddle portion 7 or 6 respectively.

The trough 18 formed by the end wall 2 at the floor of the container is connected to a filling- and discharge socket 20, which leads to a closure member. The connection to the socket 20 is located in the gusset of the vertical sheet metal element 16, which is disposed between one corner fitting 11 and the cylindrical wall section 4. The socket 20 extends approximately parallel to the longitudinal container axis, so that the filling- and discharge arrangement is accommodated within the rectangular envelope of the freight container.

In the other trough 28 at the top of the end wall 1 an inspection aperture 22 with an aerating and venting valve is provided.

Instead of two cylindrically curved wall elements, wall elements of different construction could also be fitted into the end wall frame. Thus FIG. 5 shows a wall element 23 of simple curved configuration which is erected on the inside of the cover surface 15. For the purpose of reinforcing the end wall, a rectangular section 24 is here provided abutting the cover surface 15. Since this section does not come into contact with the fluid being transported, it may consist of simple mild steel instead of alloy steel. By way of example, such a reinforcing section 25 is shown in FIG. 6 in combination with a spherically curved end wall element 26. In FIGS. 5 and 6 the re-entrant saddle portions 6 and 7 are further interconnected at least in the vicinity of their end regions by a tie rod 27. In the case of a spherical end wall, an oblique tie rod is superfluous, since the pressure forces are admitted to the surrounding frame uniformly.

The construction shown in FIG. 7 differs from those shown in FIGS. 1 to 6 in that the lower transverse beam 30 of the end wall 2 is in the form of a box section of rectangular cross-section, in the same way as the transverse beam 9; it is however open to the interior of the container.

The beam 30 thus has two horizontal walls 31 and 32 and a vertical external wall 33; the other vertical wall 34 however extends only from the lower boundary wall 32 to the edge of the side wall sections 4 and 5 and forms an arched edge 17 in conjunction with the said edge of the side wall sections. Hence the transverse trough 38 is formed inside the transverse beam 30. The filling- and discharge socket 20 is located in the wall 34. The other end wall 1 of the container may again be provided in oppositely disposed mirror image manner, i.e. the open transverse beam 30 is located at the top of the end wall and defines a pressure equalising trough within it.

In FIG. 7 an additional reinforcing- and support beam 40 is moreover attached to the outside of the horizontal wall 32 of the beam 30. The beam 40 may also be provided in the other forms of container described. It is of closed section and may consist of mild steel. The beam 40 may be of the same width as the beam 30 or it may be narrower. It may be employed for heating the transverse trough 38 (or 18), if it is provided with con-

nections for conducting a flowable heat carrier there-through.

I claim:

1. A freight container for flowable goods with two end walls comprising beams, including at least one horizontal transverse beam, which are joined together to form a frame and curved wall elements inserted into the frame, corner fittings for lifting and stacking of the container attached to the frame and longitudinal container walls extending between the end walls and connected therewith fluid-tightly, said longitudinal walls comprising intersecting part-cylindrical wall sections curved about axes which are parallel to the longitudinal container axis, the longitudinal walls having at least one re-entrant saddle portion which is parallel to the longitudinal container axis and directed into the interior of the container, wherein said horizontal transverse beam of at least one end wall opens into the interior of the container and together with an end edge of the adjacent said longitudinal container wall defines a transverse inwardly open, trough, having a depth which is at least equal to the distance between said re-entrant saddle portion and an associated trough- or crown line of the container wall concerned.

2. A freight container according to claim 1, including a filling- and discharge device connected to the trough, the latter being formed by a lower transverse beam of said end wall.

3. A freight container according to claim 1, wherein the trough is formed by an upper transverse beam of an end wall provided with an inspection- or venting aperture.

4. A freight container according to claim 1, wherein the frame comprises hollow, rectangular beams, and wherein the portion of the vertical inner wall of a transverse beam which is located inside the container is omitted.

5. A freight container according to claim 1, wherein the frame comprises hollow, rectangular beams and wherein the transverse beam forming the transverse trough comprises a horizontal boundary wall and a vertical sheet metal element, which connects said boundary wall with the longitudinal wall of the container, the end wall being directly joined to the horizontal boundary wall.

6. A freight container according to claim 5, wherein the longitudinal walls of the container are part-cylindrically curved about horizontal axes, a filling- and a discharge socket being attached to the vertical sheet metal element between the curved portion of the container and a corner of the end wall.

7. A freight container according to claim 1, having an obliquely extending tie rod between the re-entrant saddle portion and an intersection line of an end wall defined by a plurality of curved wall elements.

8. A freight container according to claim 7, having an external reinforcing fillet at the intersection line between two wall elements inserted in the end wall frame.

9. A freight container according to claim 1, having a reinforcing beam mounted externally on the horizontal transverse beam.

10. A freight container according to claim 9, wherein the reinforcing beam is of closed cross-section and provided with connection for heating means.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,814,290 Dated June 4, 1974

Inventor(s) Helmut GERHARD

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

Title page, insert the following:

[30] Foreign Application Priority Data

July 21, 1972 Germany ... P 22 35 995.1

Signed and sealed this 29th day of October 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents