Nov. 15, 1927. 1,649,292

C. H. DRAPER

SHEET METAL DRUM

Filed Sept. 6, 1923 4 Sheets-Sheet 1

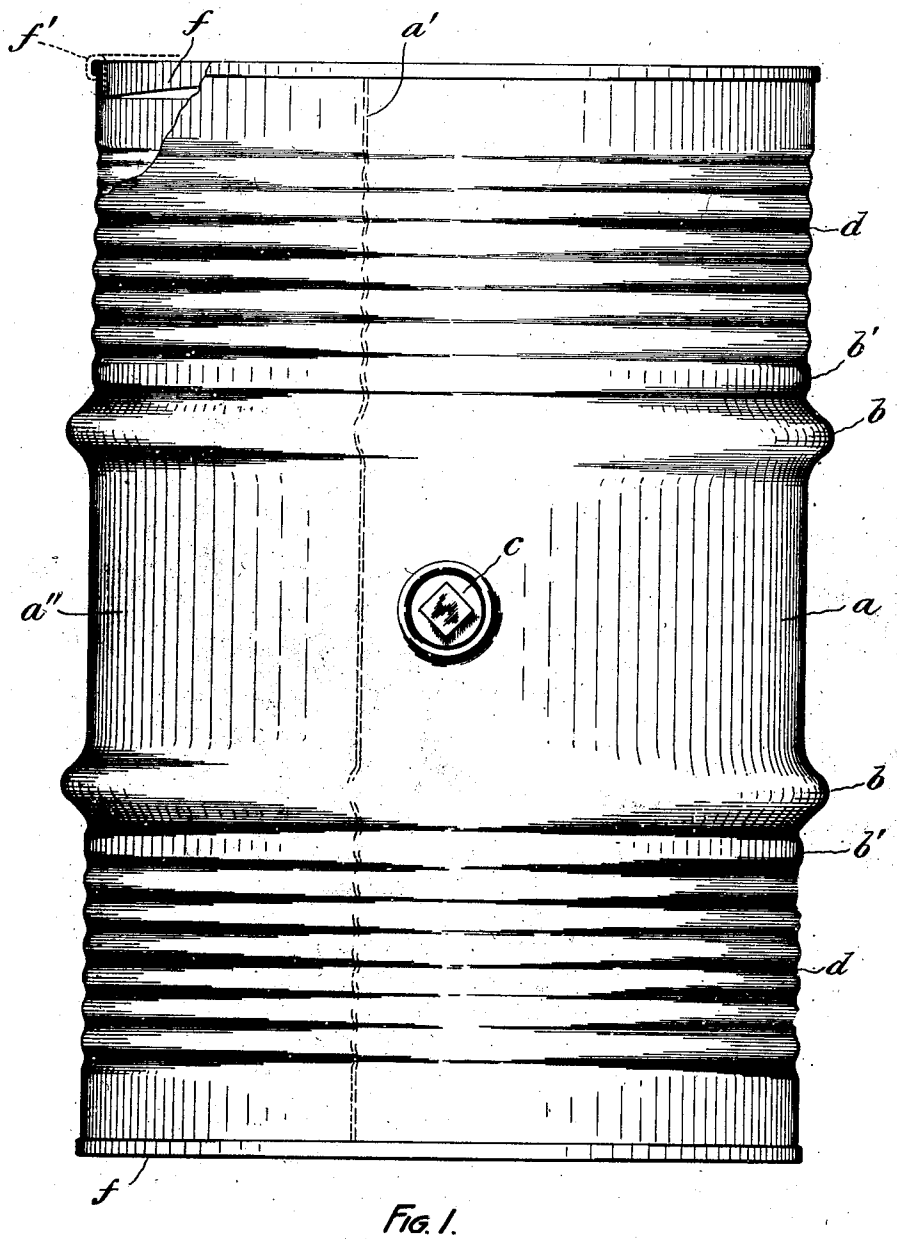


FIG. 1.

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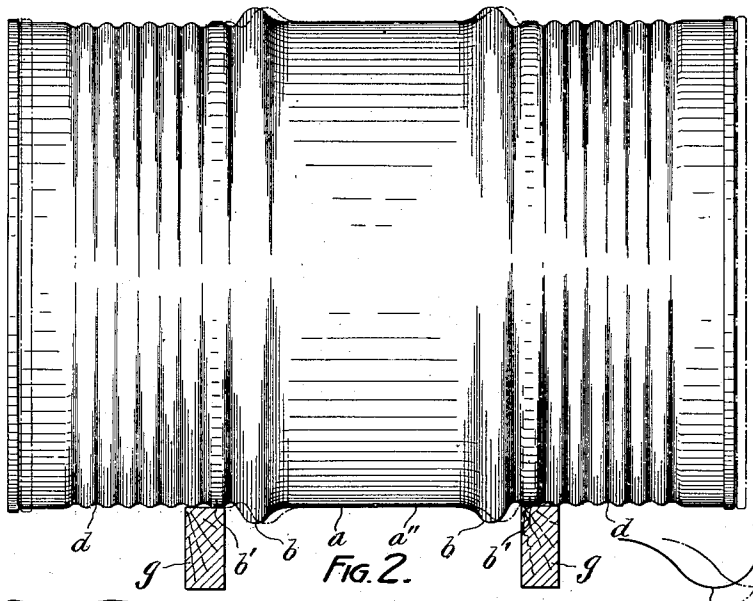


FIG. 2.

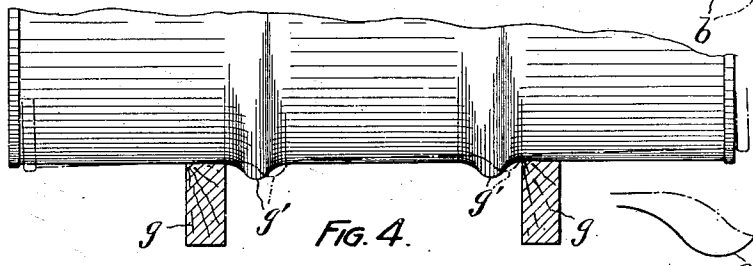


FIG. 3.

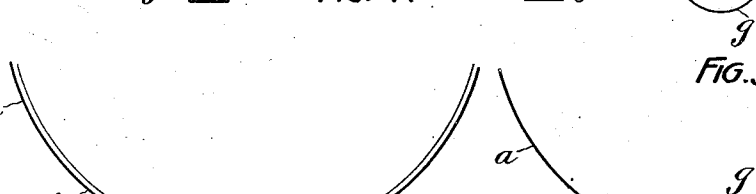


FIG. 4.

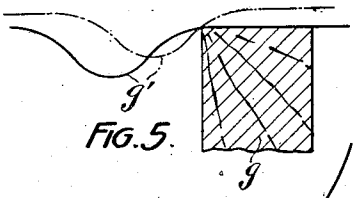


FIG. 5.

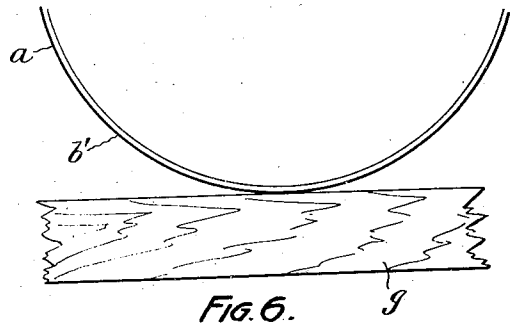


FIG. 6.

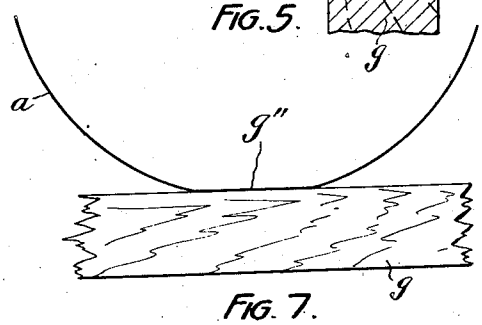


FIG. 7.

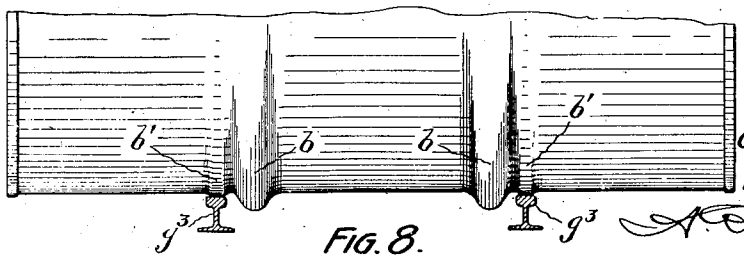


FIG. 8.

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SHEET METAL DRUM

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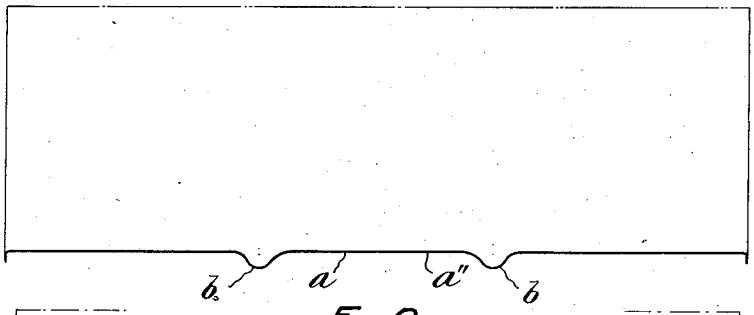


FIG. 9.

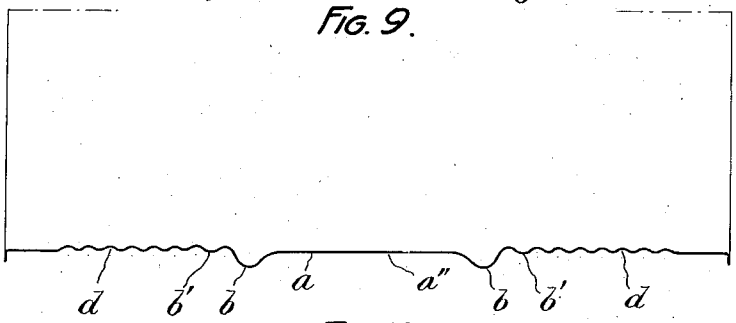


FIG. 10.

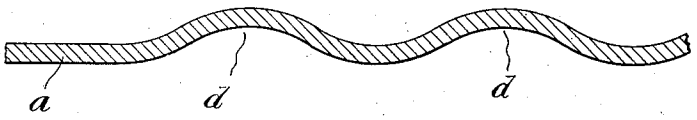


FIG. 11.

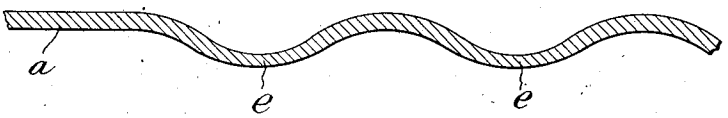


FIG. 12.

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SHEET METAL DRUM

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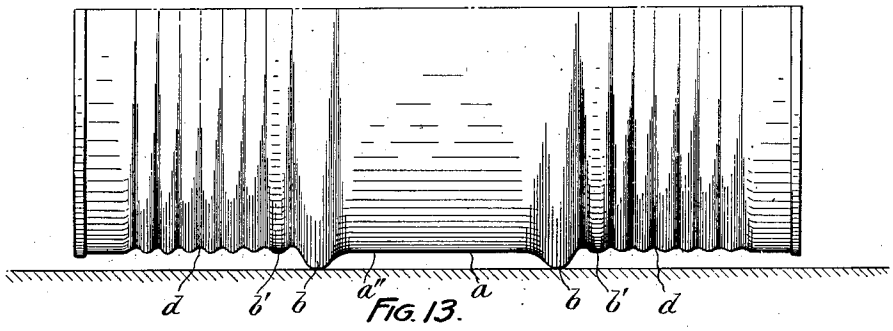


FIG. 13.

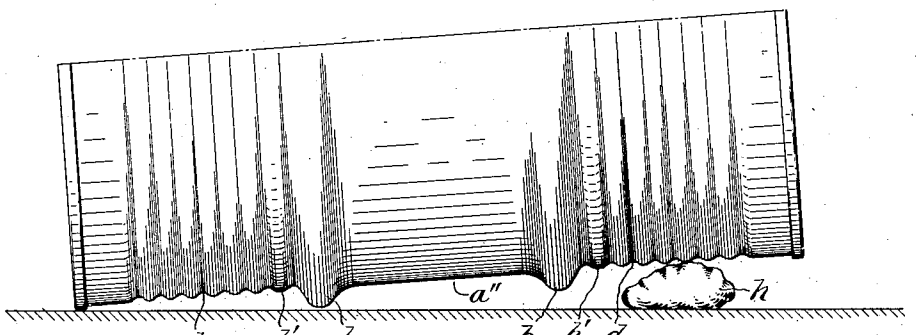


FIG. 14.

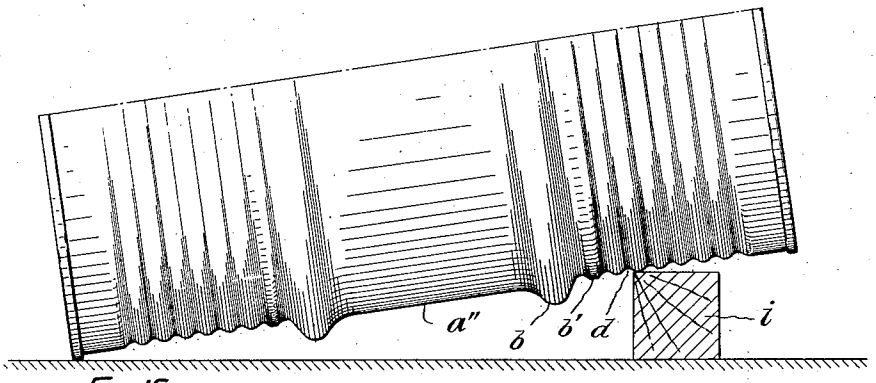


FIG. 15.

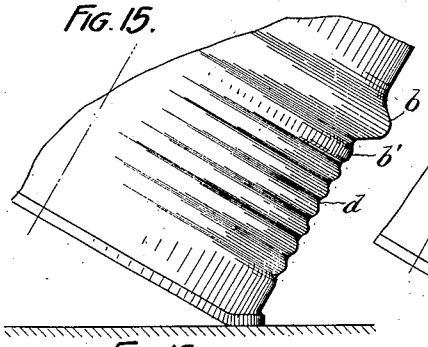


FIG. 16.

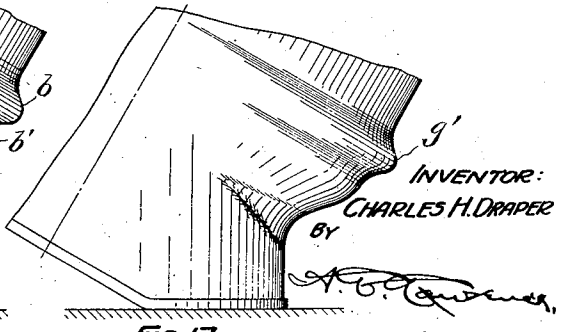


FIG. 17.

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Patented Nov. 15, 1927. 1,649,292

UNITED STATES PATENT OFFICE.

CHARLES H. DRAPER, OF CLEVELAND, OHIO, ASSIGNOR TO THE DRAPER MANUFACTURING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

SHEET-METAL DRUM.

Application filed September 6, 1923. Serial No. 661,197.

My invention relates to improvements in sheet metal drums and has for its object, first, the sectional strengthening of the drum throughout its end portions, preferably by depressed corrugations in the body of the metal; second, the provision of rolling hoops intimately associated with the corrugated areas, and, third, the interposition of auxiliary rolling hoops between the main rolling hoops and the ends of the drum, whereby said drum is better adapted for rolling upon skids.

I am well aware that sheet metal barrels and drums of the prior art have been provided with corrugations for the purpose of strengthening them, and have been constructed with rolling hoops of various types, but not in combination with suitably corrugated terminal areas or with auxiliary rolling hoops, so far as I have been able to ascertain.

In order to explain the particular features of improvement in this seemingly simple construction, it will be desirable to illustrate and enter upon a somewhat detailed discussion of the employment of my improved drum as compared with the use and adaptation of prior structures. To this end, reference may be made to the accompanying drawings, wherein:

Figure 1 is a view of a sheet steel drum in side elevation incorporating my improvements.

Fig. 2 is another view in side elevation showing the drum rolling upon skids, shown in cross section.

Fig. 3 is an enlarged fragmentary view illustrating the coaction of the auxiliary and main rolling hoops.

Fig. 4 is a fragmentary view illustrating the ordinary type of drum rolling upon skids.

Fig. 5 is an enlarged fragmentary view illustrating how the ordinary rolling hoop climbs upon a skid.

Fig. 6 is a diagrammatic sectional view illustrating the action of the arched auxiliary rolling hoop.

Fig. 7 is a similar view comparing the action of an ordinary sheet metal drum by a flattening effect when rolling on a skid.

Fig. 8 is a fragmentary view illustrating the auxiliary rolling hoop upon a narrow skid rail unassociated with terminal corrugation.

Fig. 9 is a longitudinal section taken through the cylindrical shell before the corrugations are produced.

Fig. 10 is a comparative longitudinal section of the shell illustrating its reduction in length as a result of the spinning to produce corrugated areas.

Fig. 11 is an enlarged fragmentary section of the depressed corrugated shell.

Fig. 12 is a similar section illustrating the thinning of the metal effected by expanded corrugations.

Fig. 13 is a view of the drum in side elevation illustrating the normal action of the rolling hoops on a floor.

Fig. 14 is a similar view illustrating the effect of an encountered obstruction near one end of the drum.

Fig. 15 is another view illustrating the common practice of blocking up one end of the drum for handling it.

Fig. 16 is a fragmentary view illustrating the reinforcing effect of the corrugated area against damage from severe impact or fall, and

Fig. 17 is a similar view comparing the resultant injury caused under like circumstances in a drum unprovided with such corrugated area.

Throughout the several figures of the drawings I have employed the same characters of reference to indicate similar parts.

The sheet metal drum herein shown as an embodiment of my invention is produced from a sheet steel shell *a*, longitudinally seamed at *a'* wherein expanded rolling hoops *b*, *b* are intermediately spun, as shown in Fig. 9. The central area *a''* preferably is left of ordinary cylindrical form in order to receive the bung or closure member *c* and more readily effect a tight joint therewith. Moreover, the expense of corrugating this area is avoided, since this normally is unnecessary.

The cylindrical shell is completed by spinning the slightly flattened, arched auxiliary rolling hoops *b'*, *b'* adjacent to said main rolling hoops, *b*, *b*; two areas of depressed and contiguous concave and convex corrugations, *d*, *d*, being provided intermediately of the auxiliary rolling hoops and the ends of the shell, respectively. It will be observed that the concave corrugations are fabricated or spun inwardly of the shell, as indicated in Figs. 10 and 11, whereby the

metal of the shell is compressed and not thinned, as with the ordinary practice of spinning expanded corrugations, indicated at *e* in Fig. 12.

Not only is a thinning of the metal avoided, with attendant sectional weakening of the shell or drum, when depressed corrugations are thrown into the shell in accordance with my present improvements, but the weakening of the longitudinal welded seam *a'* and formation of minute openings, attendant upon the operation of convex corrugation, likewise are overcome. Normally it is necessary to re-weld the seam of a shell that has been corrugated in the usual way, but this very rarely is required when the corrugations are depressed within the normal diameter of the sheet metal shell. The formation of the corrugated areas and the associated rolling hoops necessarily shortens the shell, as indicated by a comparison of Figs. 9 and 10.

The sheet metal drum is completed by seaming the heads *f*, *f* at either end and, if desired, protecting the head seam by a chime ring *f'*, in accordance with well recognized practice; the complete drum being shown in Fig. 1.

Although the more common mode of handling these drums involves rolling them from place to place upon the expanded rolling hoops *b*, *b*, it is found that said drums must be transported long distances, or rolled from one elevation to another upon skids. Accordingly, I have provided the auxiliary rolling hoops *b'*, *b'*, which are adapted to engage the skids and support the drum while rolling thereon. Moreover, it will be observed that the adjacent rolling hoops *b*, *b* are formed with relatively abrupt outer inclines, like the flange of a wheel, so that the drum will remain on the skidway, *g*, *g*. The action of these two members is indicated by the dash and dotted line position, enlarged in Fig. 3, as one of these flange-like hoops *b* approaches the skid *g*.

A comparison with the ordinary type of barrel having rolling hoops *g'*, *g'* may be made by considering Figs. 4 and 5, wherein the gradual incline of the engaging side of the rolling hoop rides upon the skid *g*, first scraping any paint or protective covering from the metal and frequently riding on the top of the skid itself. Another sort of action is portrayed in Fig. 7 which shows the flattening action exerted upon the cylindrical portion of an ordinary barrel or drum when its supported weight, approximating five hundred pounds, filled, is carried upon skids. The chord portion *g''* thus formed is progressive, effecting a weaving or displacement of the sheet metal sectionally that is injurious to the longitudinal seam and impedes rolling action.

On the contrary, it will be appreciated that the series of corrugations and the main and auxiliary rolling hoops provided upon my improved sheet metal drum all coact to maintain the true cylindrical form of the completed shell and the flattened arch-like form of the auxiliary rolling hoops preserve the annular contour of these members even when supporting the weight of the drum and contents upon skids, as indicated in Fig. 6. The adjacent elevated rolling hoops and corrugated areas, merging on either side into the auxiliary rolling hoops mutually reinforce each other and assure a much stronger drum construction than any presented by the prior art. I may add, however, that it is not invariably necessary to associate the corrugated area with these rolling hoops, as I have shown a modification in Fig. 8. Therein a narrow skid rail g^3 is shown supporting the auxiliary rolling hoop *b'*, while the end portion of the drum is left of true cylindrical form, and is not reinforced by any corrugations.

The function of the depressed corrugated areas of my improved sheet steel drum, however, should not be overlooked or minimized. Thus, with the drum rolling upon a level floor, as shown in Fig. 13, these areas afford adjacent flanking supports for the metal of the rolling hoops while undergoing the strain of supporting the drum and its contents progressively.

Again, deformation of the end portions is largely obviated in the event that an obstruction, such as the stone *h*, is encountered by the rolling drum, as indicated in Fig. 14. If the shock or blow, however, is sufficient to produce an indentation, the corrugated depressions of compressed metal will better resist and constrict the effect than would an ordinary type of drum.

In Fig. 15 is shown a common expedient for terminally supporting a drum by a wooden block *i* preparatory to up-ending said drum, lifting the end from the left, in order better to position the drum and assist in its elevation. Similarly, a block may be gradually pushed under the heavily weighted drum to prevent it from falling back and possibly injuring the worker's foot. In either case the depressed corrugations are efficient in stiffening the drum against local stresses and strains, and to an extent not attainable with corrugations necessarily thinned in their fabrication.

Still another and very common cause of injury to sheet steel drums is safeguarded by the depressed corrugated areas; this existing in the effect of an edgewise impact of a falling container and its contents. In Fig. 16 I have endeavored to indicate how well the resultant deformation is minimized, as compared with a similar accident to an ordinary type of drum, shown seriously dented or crumpled in Fig. 17 of the draw-

ings. An injury of this extent quite obviously impairs the appearance of the container and materially decreases its capacity, in addition to weakening the resistance to further damage or strain.

I wish to have it understood that I do not limit the present invention to the precise structure or details of the embodiment herein shown and described, since its features are subject to modification as defined in and by the following claims.

I accordingly claim and desire to secure by Letters Patent, the following:

1. The herein described method of locally reinforcing sheet metal drums, which consists in producing areas of contiguous depressed and convex corrugations separated by a cylindrical body portion substantially sinuous in cross-section annularly adjacent to the heads thereof for reinforcement and within the original diameter of the body portion, substantially as set forth.

2. The herein described method of reinforcing sheet metal drums, which consists in producing elevated rolling hoops intermediately of the cylindrical body and terminal areas of concave and convex annular corrugations substantially sinuous in cross-section adjacent to said rolling hoops, substantially as set forth.

3. The herein described method of fabricating sheet metal drums, which consists in producing elevated rolling hoops of maximum diameter, auxiliary rolling hoops of reduced diameter and terminal areas adjacent to said rolling hoops in positions to reinforce them of annularly corrugated construction, substantially as set forth.

4. A sheet metal drum having two spaced rolling hoops formed intermediately of its cylindrical body portion and two adjacent corrugated areas in the body portion positioned respectively to reinforce said rolling hoops between said hoops and the heads of the drum, substantially as set forth.

5. A sheet metal drum having two spaced rolling hoops of maximum diameter, two adjacent auxiliary rolling hoops of reduced diameter formed intermediately of the body portion and two depressed corrugated areas positioned respectively to reinforce the areas of the rolling hoops against incidental strains between said auxiliary rolling hoops and the respective heads of the drum, substantially as set forth.

6. A sheet metal drum having two spaced rolling hoops and two adjacent auxiliary rolling hoops of reduced diameter all formed intermediately of the body portion of said drum, and two immediately adjacent corrugated areas positioned respectively to reinforce said rolling hoops between the hoops and the heads of the drum, substantially as set forth.

7. A sheet metal drum having two spaced rolling hoops formed intermediately of the cylindrical body portion of said drum and two immediately adjacent corrugated areas positioned respectively to reinforce said rolling hoops between the hoops and the heads of the drum, comprising concave and convex annular corrugations in the terminal portions of the body, substantially as set forth.

8. A sheet metal drum having elevated rolling hoops presenting abruptly inclined sides and adjacent auxiliary rolling hoops of reduced diameter together forming flanged treads for the drum, substantially as set forth.

9. A sheet metal drum having its shell reinforced by depressed corrugated areas adjacent to its ends, interposed auxiliary rolling hoops, and elevated intermediate rolling hoops, substantially as set forth.

10. A sheet metal drum having two spaced rolling hoops expanded intermediately of a cylindrical body portion of said drum and of two immediately adjacent corrugated areas substantially sinuous in cross-section positioned respectively to reinforce said rolling hoops and depressed substantially within the original diameter of the drum, substantially as set forth.

In testimony whereof I do now affix my signature.

CHARLES H. DRAPER.