

June 6, 1933.

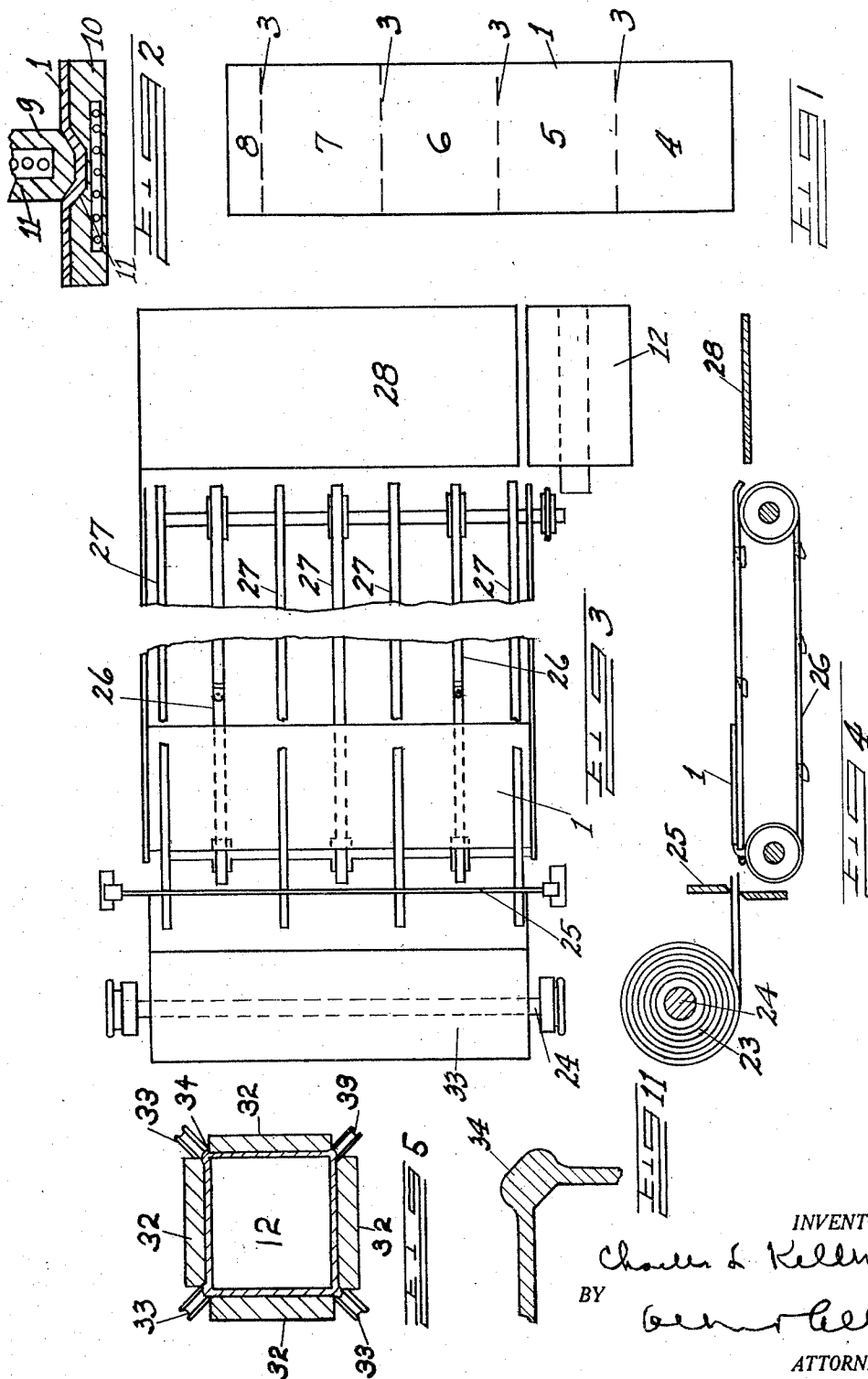
C. L. KELLER

1,913,055

PROCESS OF MAKING SHIPPING CONTAINERS

Filed July 2, 1928.

2 Sheets-Sheet 1



June 6, 1933.

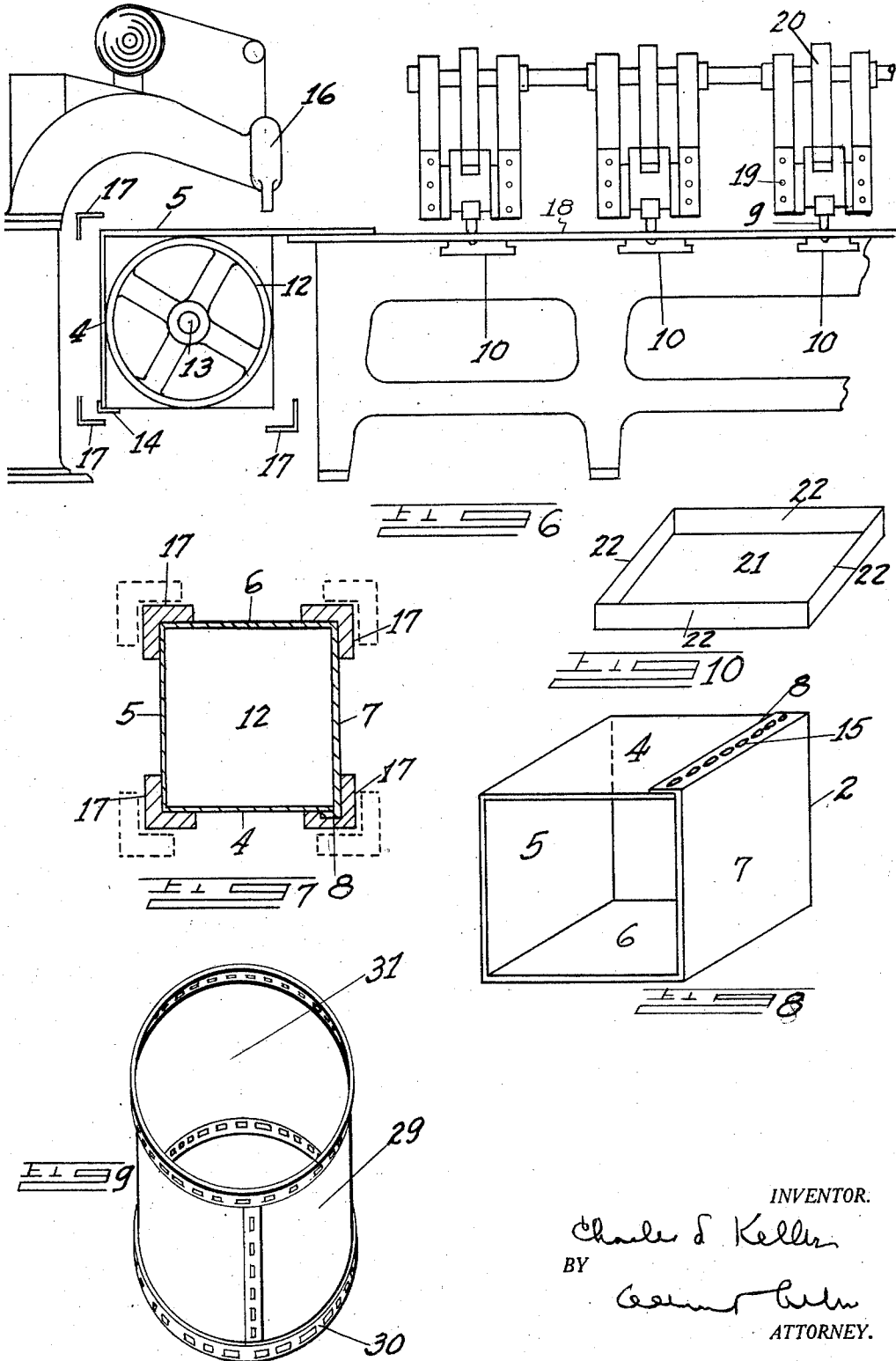
C. L. KELLER

1,913,055

PROCESS OF MAKING SHIPPING CONTAINERS

Filed July 2, 1928

2 Sheets-Sheet 2



INVENTOR.

Charles S. Keller

BY

George A. Keller

ATTORNEY.

UNITED STATES PATENT OFFICE

CHARLES L. KELLER, OF CINCINNATI, OHIO, ASSIGNOR TO THE RICHARDSON COMPANY,
OF LOCKLAND, OHIO, A CORPORATION OF OHIO

PROCESS OF MAKING SHIPPING CONTAINERS

Application filed July 2, 1928. Serial No. 289,935.

My invention relates to the manufacture of shipping containers primarily from a material which is at least locally plasticizable by heat; and one of its specific applications is in the manufacture of shipping cases from a fibrous bituminous composition, which, although formed into sheets by a felting operation upon a paper machine or equivalent apparatus, is nevertheless, by reason of the proportion of its ingredients and the relationship of the binder to the filler materials, particularly the fibrous constituent thereof, plastic in its nature and capable of being deformed under heat permanently. My invention is not restricted to the use of this specific material, however, it being equally applicable to other materials. The specific material which I prefer to use is a product formed by the general process of mixing together fibrous material and asphaltic binder material while the latter is in an adhesive and extensible condition as is taught by the patent to James C. Woodley #1,156,122, afterward bringing this mix into water suspension in such a way that the resultant pulp is a pulp comprising fibers and bitumen in intimate association in the pulp as such. This process and product are described and claimed in the application of Harry C. Fisher, Serial No. 314,551, filed October 23, 1928. Another way of making a bituminous pulp is set forth in the co-pending application of Earl P. Stevenson and Harry A. Buron, Serial No. 316,611, filed Nov. 1, 1928 issued as Patent 1,771,150, dated July 22, 1930. The teachings of both of these applications antedate my disclosure. The pulp is then formed on a screen as in a paper making machine or an Oliver continuous board machine, and the sheeted product dried under heat. My invention, however, is equally applicable to sheeted plastics otherwise formed as by pressing, rolling or extrusion; nor is it limited to any particular plastics, formulæ, or mixing methods.

My invention is also primarily applicable

to containers made of a formed heat plastic material which is at least locally replasticizable under heat so that, a container having been formed thereof, the meeting edges of the container may be locally fused together so as to give practically a monolithic structure, protecting the contents of the container by a solid wall impervious to moisture and gases, as is described in my co-pending application Serial No. 289,934, filed July 2, 1928.

The primary object of my invention is to provide a method and mechanism for forming containers of such character and from such materials cheaply and efficiently with a minimum of equipment and with the greatest consistent speed. I prefer to do this, utilizing the principle of the plastic formation of corners, scores and the like; i. e. of forming these while the material is at least locally plasticized.

It is another object of my invention to provide a method of forming upon corners or lines of scores, reinforcing bodies of the plastic material.

It is a further object of my invention to provide means whereby sheets of material may be locally plasticized where desired, and means whereby the locally plasticized sheets may be rapidly formed into a container or other structure and the meeting edges thereof fastened as may be desirable. These and other objects of my invention which will be apparent on reading these specifications, I accomplish by that certain process and mechanism of which I shall now describe preferred embodiments, reference being made to the drawings which accompany this specification, it being understood that my invention is not limited to the specific embodiments which I shall describe as illustrative.

In the drawings:—

Figure 1 shows a sheet of material cut to proper size and ready to be formed into a shipping container.

Figure 2 shows heated dies for forming a deformation or score line therein.

Figure 3 is a vertical elevation of an apparatus comprising a source of sheeted material, means for cutting it into pieces of the proper size, means for locally plasticizing the material along the lines of proposed scores, conveying devices, and a mandrel upon which a container may be formed.

Figure 4 is a sectional view of the same apparatus, but not including the mandrel.

Figure 5 shows more or less diagrammatically apparatus for the production of a container structure with reinforced angles.

Figure 6 is a side elevation of a device comprising a mandrel, corner moulding members, and a multiple stitcher.

Figure 7 is a sectional view of a mandrel showing the action of corner moulding members.

Figure 8 is a view in perspective of a stitched container shell of a type adapted to be formed by the mechanism of Figures 3, 4 and 6.

Figure 9 is a different type of container shown complete.

Figure 10 is a bottom or top member such as is used in the container of Figure 8.

Figure 11 is a section of a corner of a container showing a reinforcement as produced by the mechanism of Figure 5.

In the formation of shipping containers from sheeted materials of which the manufacture of solid fiber shipping containers, so called, is illustrative, a blank is cut as may be desired to the proper size, and with slots for the formation of flaps in certain types. The blank is scored to facilitate bending with as little as possible disruption of the fibrous structure. Container boards are usually of laminated construction, being built up by pasting together several plies of box board. They are scored by being deformed upon a comparatively wide line in such a way that a ridge is formed in the material on what is intended to be the outside corner of it when bent. This ridge forming process, while it may be accomplished otherwise, is usually done by a male and female die. It has the effect of separating the plies of the material, and of giving particularly to the parts in or adjacent the score upon what is to be the inside of the container such a configuration as will permit them to double up and allow for the contraction incident to bending, while the outer layers are opened up and are permitted to assume a relationship to the body of the board which more or less compensates for the tension under which the outer layers are placed. Nevertheless, the scoring substantially weakens the board, and the failure of shipping containers of this type is primarily at the score line.

As sharply distinguished from this practice, I have discovered that sheets of locally

plasticizable composition may be locally deformed as by a scoring or bending operation where plasticized, and then permitted to harden so that a bend is formed therein without at all weakening the sheet or even disrupting the fibrous structure. By rendering the sheet locally plastic, I may deform it by means of dies, rollers, or the like in such a way that a new structure is formed with all the inherent strength of the old. I may furthermore form bends in a plastic sheet and by utilizing an excess of the plastic material at the bend, I may form there in addition to the new structure, a greatly thickened structure which will give me at the corners or score lines, not only a structure unimpaired in strength, but a structure, the inherent strength of which has been greatly increased. So far as I am aware, I have accomplished these two very important objects commercially for the first time in materials of the class to which my invention is addressed.

As illustrative of the process, I shall describe the formation of the container shell 2 of Figure 8 from the sheet 1 of Figure 1. The sheets, however formed, will be understood as cut to size and stacked ready for use. To make the finished shell it will be necessary to bend the material into shape along the four lines 3 (which correspond to score lines in ordinary container practice), thereby forming sides 4, 5, 6, and 7, and the attaching flap 8. I may do this by forming in the material under the influence of heat a score as by means of a male die 9 and a female die 10, shown in Figure 2 as containing electrical heating elements 11. The dies 9 and 10 will be understood as mounted respectively upon a suitable plunger and table; and preferably, in commercial practice, there will be four sets of dies to a machine, so that the operator may form the four scores necessary in the sheet 1 at one time. When the scores have been formed, and the material locally plasticized, and before the compound has reset, the operator bends the blank to shape to form the container shell 2 (Figure 8). Preferably this will be done about a mandrel such as is shown at 12 in Figure 6. The mandrel will, of course, be of the proper size to form the interior of the shell, and it may be, and preferably is, revolvably mounted upon a horizontal shaft 13. At one corner of the mandrel is a clip 14 under which the operator may engage the side 4 of the blank, flush with the edge of the mandrel. Upon rotation of the mandrel the blank will be formed thereabout into a complete shell, with the attaching flap 8 overlying one edge of the side 4. The operator will then cause the attaching flap to be fastened to the side, as by a line of stitches 15. The stitching may be done by a multiple head stitcher 16 operating upon the mandrel as an anvil, as may be readily under-

stood from Figure 6. The attaching flap may be otherwise fastened to the side, if desired, as by riveting, cementing, and the like; or the flap and the overlapped portion of the side may both be plasticized by heat and pressed and/or rolled into a monolithic structure in which the parts are essentially welded together. Before or after fastening the flap, corner forming members 17 may be caused to mould the corners of the container snugly against the mandrel. This action is more clearly shown in Figure 7, in which the corner formers are shown in the dotted line view in a position to clear the mandrel as it rotates, and in solid lines in the process of forming the corners. Means for advancing and retracting the corner formers have not been shown. Any suitable means may be employed. The steps of plasticizing the sheet locally, with the formation of score lines, wrapping the blank about the mandrel, pressing the corners, and stitching, will be thought of as following each other in rapid succession so that the bending and corner forming are done before the plasticized portions have become reset. Thus I have shown in Figure 6 a table 18 adjacent the mandrel and stitcher head. This table bears in proper spaced relationship the dies 10. The dies 9 are slidably mounted upon a head portion 19 so as to be capable of being advanced toward or retracted from the dies 10 by means of an eccentric actuating device 20 or the equivalent. A blank may therefore be locally plasticized and scored upon the table and removed immediately to the mandrel for the forming and stitching operations. The finished container shell is slid endwise from the mandrel.

The type of container shell I have shown in Figure 8 is similar in shape to the ordinary recessed end container formed commercially of the so-called solid fiber board. A lid, 21 in Figure 10, has upturned edges 22 forming what might be termed a tray. This lid is then set within the shell with the upturned edges outwardly disposed, and the container is completed by stitching around the meeting edges, as will be readily understood by those skilled in the art. My lids are, of course, similar in shape, but are formed of the same sheeted composition as the shells. They may be made by plasticizing sheets cut to the proper size, and moulding them to the shape 21 between dies, or they may be made by cutting, locally plasticizing, scoring, bending to shape and stitching the corner overlaps. I prefer to make them by direct moulding in dies.

The simple apparatus of Figure 6 may be varied to suit different commercial operations. I have indicated at 23 in Figure 4 a source of sheeted material which may be a wound roll mounted upon a shaft 24, with a shear 25 to sever the material into the sheets 1. Or it

may consist merely of a pile of preformed sheets, hand or automatically fed onto the apparatus next to be described. The sheets 1 are moved by means of a chain or other conveyor 26 over a table-like device having portions 27 which are hot so as to plasticize the material as it is moved over them. These portions are preferably metallic parts electrically heated. They extend longitudinally of the direction of movement of the sheets and are adapted continuously to heat only the parts of the sheets to be bent during the travel of the sheets thereover. The conveyor and heating devices will be long enough to produce the desired plasticity. In commercial operation the conveyor and heated portions will be adjustable, so that the device can be used in forming containers of different sizes.

The conveyors will deliver the sheet upon a table 28 whence the operator may remove it to the mandrel 12 for forming it up, as hitherto described. The mandrel shown may be one of a series revolvably mounted, but adapted to be moved into and out of position, so that any given mandrel, after receiving the blank may be moved out of the way during the corner pressing and stitching operations, and its place next the table 28 taken by another.

I have used the formation of shells for recessed end containers as an illustrative embodiment of my invention. I am not restricted in practicing it to any given type of container, however. I may, for example, form the keg-like container 29 of Figure 9 upon a cylindrical mandrel, place over one end the closure 30, and stitch it in place also upon the mandrel as an anvil, slipping therefrom at the end of this operation a completed container ready for filling. Such a container makes a suitable package for nails and the like. After filling, the top 31 is inserted and stitched in place in the ordinary way for closing recessed end containers. Containers with slots and integral closure flaps may also be made embodying my invention upon modifications of apparatus such as I have described or its equivalent, which are within the capabilities of those skilled in the art to construct by modifying existing designs for the practice of my process. An important aspect of my invention is that I start with sheeted material properly cut, locally plasticize portions thereof and then bend the parts of the sheet to proper relationship, the bend occurring in the plasticized portion, and then permit the parts to set in the new relationship. Obviously this aspect is not restricted to particular apparatus.

Since my invention contemplates the bending of the sheets upon locally plasticized lines, with or without preformed lines of score, another aspect of my invention is the

formation by plastic moulding of thickened structures in the plastic at the points where greatest strain comes. Although by plasticizing and bending the material, thereafter allowing it to reset, I secure corners in my finished containers which are as strong as the unbent portions of the material, nevertheless some added strengthening at the corners is advantageous for the reason that in use the greatest strain and abrasion occurs at the corners or angles in the containers. My invention contemplates the moulding of thickened structures in the locally plasticized sheet at these points. It may be practiced in a number of ways. After the sheet has been formed upon the mandrel 12, and before the plasticized portion has reset, I may roll it toward the corners by means of rollers, so as to thicken it there. A process which I prefer, however, is illustrated in Figure 5. Plasticized lines, with or without lines of score, are formed in the material at greater than normal distances, and the sheet itself is made somewhat longer than would otherwise be necessary. When formed about the mandrel 12, it will therefore make a loose fit. Plungers 32, less in area than the sides of the finished container are advanced to press the material into snug contact with the mandrel. This will produce bulges of the still plastic material at the corners. By means of rollers 33 I then roll these bulges down tight against the mandrel, which has preferably beveled edges. The result of this is to form beads 34 (Figure 11) at the corners of the container, thereby greatly increasing the strength there. Of course, the shape of the beads may be varied as desired. The sides adjacent the bead may also be progressively thickened toward it. All of the devices shown in Figure 5 may be operated either by hand or automatically. Instead of, or in addition to beads at the corners, the container may be otherwise strengthened as by the moulding therein of corrugations and the like. Thus the container of Figure 9 may be advantageously strengthened by moulding transverse peripheral corrugations therein.

It will be clear from a reading of these specifications that various modifications in my invention may be made by those skilled in the art without departing from the spirit of it; and I desire not to be restricted to the illustrative embodiments which I have shown and described.

What I claim as new and desire to secure by Letters Patent, is:—

1. The process of forming articles from sheets of locally plasticizable composition which comprises plasticizing said sheets locally at places where deformations are to occur, forming said sheets loosely about a form so as to leave excess material in said plasticized areas and moulding, at least in part, the

composition in said plasticized areas to new thicknesses against said form, before said composition has reset.

2. The process of forming articles from sheets of fibrous bituminous composition which comprises plasticizing said sheets locally at places where deformations are to occur, forming said sheets loosely about a form so as to leave excess material in said plasticized areas and moulding, at least in part, the composition in said plasticized areas to new thicknesses against said form, before said composition has reset.

3. The process of forming a container from a sheet of locally plasticizable composition which comprises cutting said sheet as required, plasticizing said sheet locally at places where bends are to be formed therein, bending said sheet loosely about a mandrel so as to leave excess material in said locally plasticized areas, and moulding in said areas reinforcing structures from said plasticized composition before said composition has reset.

4. The process of forming a container from a sheet of fibrous bituminous composition which comprises cutting said sheet as required, plasticizing said sheet locally at places where bends are to be formed therein, bending said sheet loosely about a mandrel so as to leave excess material in said locally plasticized areas, and moulding in said areas reinforcing structures from said fibrous bituminous composition before said composition has reset.

5. The process of forming a container from a sheet of locally plasticizable composition which comprises cutting said sheet as required, plasticizing said sheet locally at places where deformations are to be made, bending said sheet about a mandrel, and moulding reinforcing structures from said plasticized areas before said composition has reset.

6. The process of forming a container from a sheet of locally plasticizable composition which comprises cutting said sheet as required, plasticizing said sheet locally at places where bends are to be formed therein, bending said sheet loosely about a mandrel so as to leave excess material in said locally plasticized areas, and moulding in said areas reinforcing structures from said plasticized composition before said composition has reset, and joining the meeting edges of said sheet.

7. The process of forming a container from a sheet of fibrous bituminous composition which comprises cutting said sheet as required, plasticizing said sheet locally at places where bends are to be formed therein, bending said sheet loosely about a mandrel so as to leave excess material in said locally plasticized areas, and moulding in said areas reinforcing structures from said fibrous bituminous composition before said composition has

reset, and joining the meeting edges of said sheet.

8. The process of forming a container from a sheet of locally plasticizable composition
5 which comprises cutting said sheets as required, plasticizing said sheet locally at places where deformations are to be made, bending said sheet about a mandrel, and moulding reinforcing structures from said
10 plasticized areas before said composition has reset, and joining the meeting edges of said sheet.

CHARLES L. KELLER.

15

20

25

30

35

40

45

50

55

60

65