

Sept. 22, 1942.

P. R. SIMMONS

2,296,744

APPARATUS FOR FORMING AND DEODORIZING PAPER PLATES

Filed June 18, 1938

3 Sheets-Sheet 1

FIG. 1

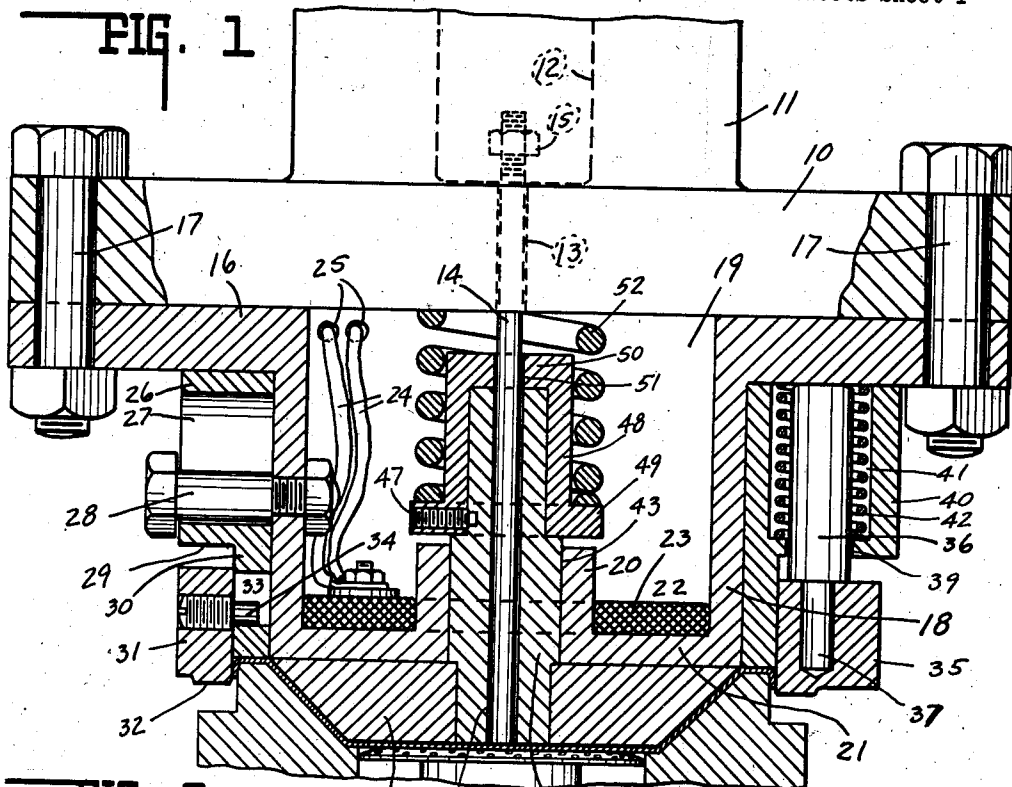
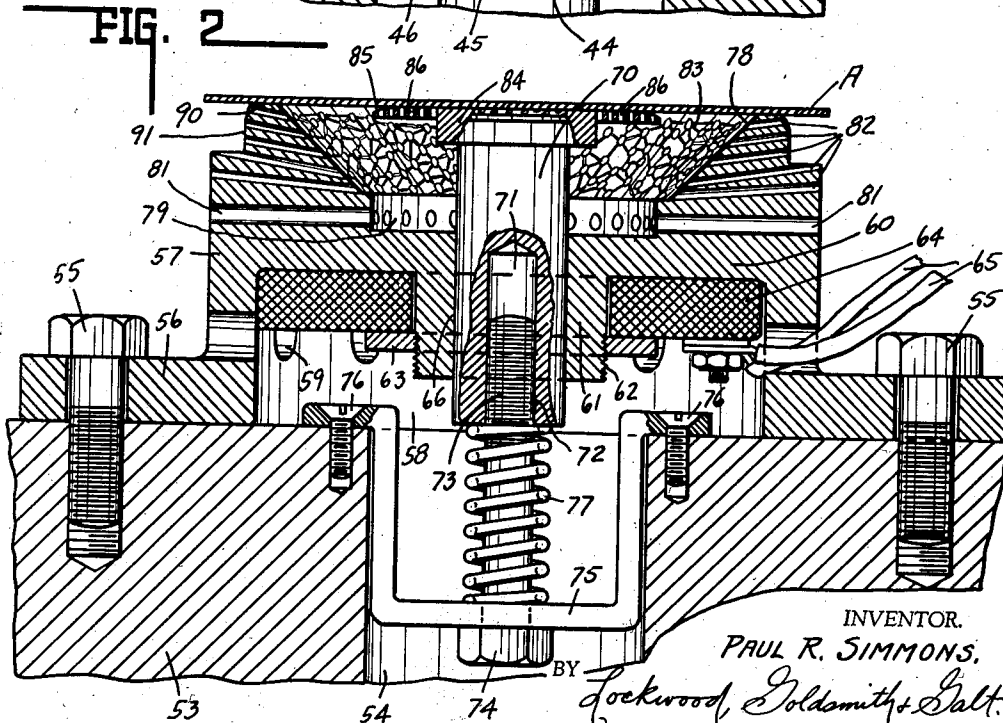


FIG. 2



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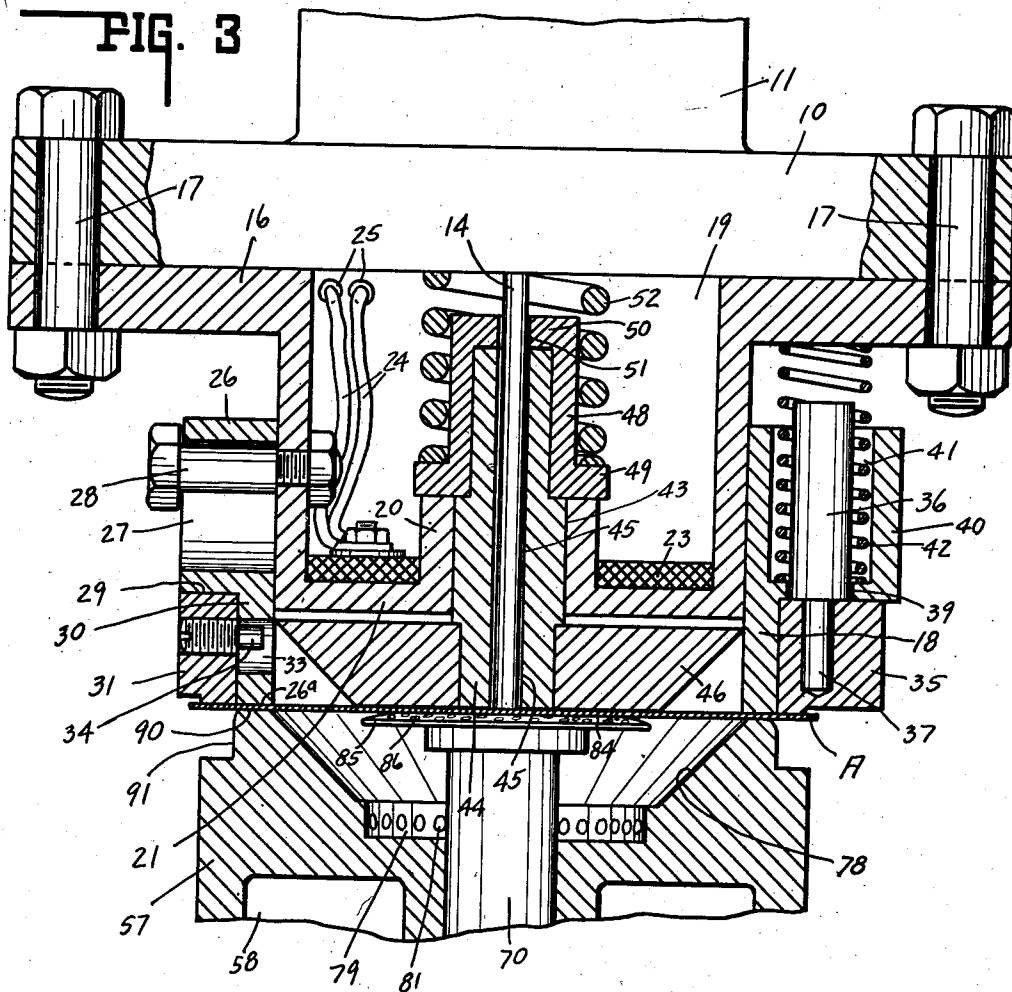
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3 Sheets-Sheet 2

FIG. 3



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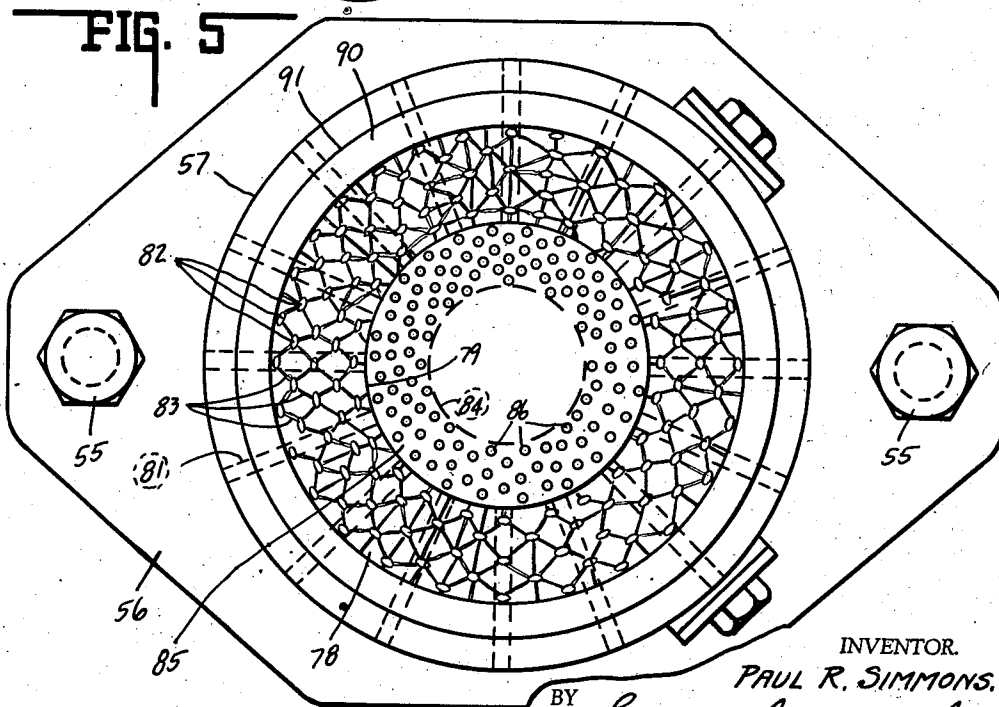
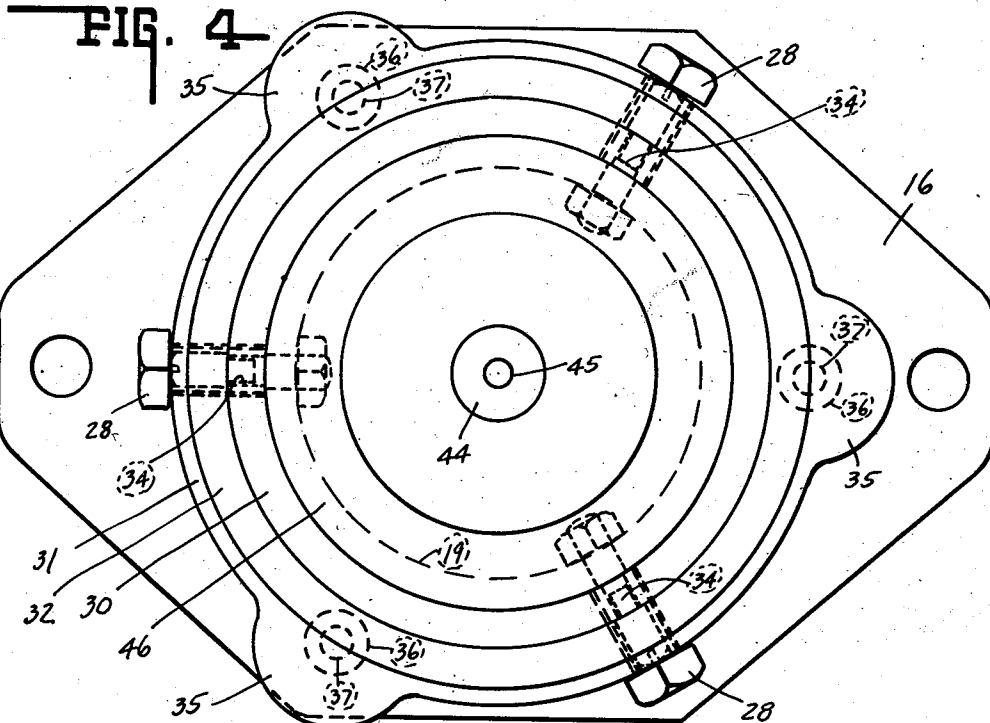
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UNITED STATES PATENT OFFICE

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APPARATUS FOR FORMING AND DEODORIZ-
ING PAPER PLATES

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Application June 18, 1938, Serial No. 214,603

11 Claims. (Cl. 18-35)

This invention relates to a plate forming mechanism.

The chief object of this invention is to provide a device wherein relatively low cost paper stock may be formed into plates suitable for many purposes but more especially suitable for the baking of pies and the like.

The invention is adapted to form a baking plate in such shape that the pie ingredients cannot engage the uncalendered portion of the paper stock, thereby discoloring the exterior of the plate so as to make an unsightly commercial product in the pie industry.

Heretofore certain grades of paper board such as card board stock, and the like, have been highly objectionable for use in a plate of this character, for the reason that upon baking the article in the plate, there is imparted to the article an odor from the plate and the present invention is directed to the removal of this odor and the apparatus disclosed herein does remove such odor if the same be inherent in the paper board stock utilized.

Another feature of the invention is directed to the formation of a plate including a peripheral skirt about the rim portion of said plate for the protection of the exterior surface of the plate, as before mentioned, and this heretofore has been impossible of attainment.

This application is more especially directed to the apparatus for forming a paper plate capable of the aforesaid use and from the aforesaid material.

The chief difficulty of forming a skirt upon the rim of a plate and which heretofore has always prevented formation thereof without cracking or extreme buckling, has been in the failure to properly handle the paper board stock in the initial steps of plate formation.

The present invention, therefore, so far as the process is concerned, is directed to the proper sequential handling of the paper board stock to form a paper plate of the character previously referred to.

In paper dish formation, if the plates are of circular character, the paper board stock or blank from which the same is to be formed is usually of the desired circular outline and size. In the present invention, the stock or blank is yieldingly held in peripheral relation adjacent its periphery and is centrally held in initial position or initial location. Thereafter the central or well portion of the plate is formed, the stock flowing into the well by reason of the yielding peripheral retention thereof and in opposition

thereto. Previous to the final completion of the well portion, the extreme outer peripheral portion of the plate stock is turned into skirt formation and the final step of the process includes the final formation of the well portion and the skirt accompanied by a so-called ironing action.

The paper board discs supplied to the apparatus are usually in tempered condition. By "tempered" condition, as the same is well understood in the paper board art, is meant "dry" paper board stock either having the desired moisture content or initially dry stock which has been subjected to moistening usually by steam spraying. They may be of any suitable material and certain grades of card board, one face of which is calendered, may be employed. The calendered face is positioned upwardly. The uncalendered face constitutes the exterior of the plate.

In the formation of the plate, heat is utilized. This is to remove the tempering moisture included in the paper stock. The forming die arrangement is so constructed that the steam generated by the heat of the dies in the contact with the tempered stock drives out that steam and the same carries with it all objectionable odors. The die arrangement, therefore, is of ventilated character for the release of this generated steam.

The resulting plate so formed is substantially free from buckles, wrinkles and more especially fractures. The resulting plate has all of the advantages previously described.

One form of apparatus by which the aforesaid invention may be carried out, is illustrated in the drawings.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

In the drawings,

Fig. 1 is a vertical sectional view through the top portion of the female die structure and the superposed male die structure, parts of the support for the latter and associated mechanism being shown in elevation, the parts being shown in the final plate forming position.

Fig. 2 is a similar sectional view of the female die portion, its support, and with a disc of paper board stock associated therewith preliminary to subsequent formation thereof into plate form.

Fig. 3 is a view similar to Fig. 1 but illustrates the parts in the initial position with the disc of paper board stock included between the two forming dies.

Fig. 4 is a bottom plan view of the male die structure.

Fig. 5 is a top plan view of the female die structure.

In the drawings, 10 indicates the main base portion of the plunger having the body portion 11 reciprocable by any suitable means and apertured as at 12. The base is apertured as at 13 and a rod 14 is slidable therein and its upper end is threaded and mounts a nut 15 within the chamber 12. A die head includes the base portion 16 and the same is suitably secured to the base portion 10 as at 17. The head portion 16 includes a depending cylindrical portion 18 which is recessed, providing the chamber 19.

Extending upwardly into said chamber is a collar portion 20 carried by the transverse portion 21 of the cylindrical portion. This forms a channel 22 in which is mounted a suitable heating element, such as of electrical character 23, supplied with electrical energy by wires 24 introduced into the chamber portion 19 as at 25.

Slidably mounted on the cylindrical portion 18 is a collar portion 26 and the same includes a plurality of elongated slots 27 adapted to receive bolts 28 carried by the cylindrical portion 18. These serve as guides and stops, the stop function being illustrated by comparing the right hand portions of Figs. 1 and 3. This collar portion is reduced as at 29 forming a cylindrical wall 30. Slidably supported thereby is another collar portion 31 having a forming lower end 32.

The collar member 26 in the portion 30 thereof is provided with longitudinally directed elongated slots 33. The collar 31 is provided with guide pins 34, each of which rides in a slot 33. Laterally projecting lugs 35 upon the skirt forming member 31 mount upwardly extending pins or abutments 36 as at 37. These pins extend through apertures 39 in the laterally directed lug portions 40 upon the collar 26, the lug and collar being apertured at 41 to form a chamber into which the pin portion 36 projects. A coil spring 42 seats against the lower portion of the chamber 41 at its lower end and bears against the lower face of the portion 16 at its upper end and encircles pin 36.

The normal rest position of the several portions of the male device is shown in Fig. 3 and in this figure it will be noted the pin 36 projects above the top of the collar 26 about $\frac{1}{4}$ ".

Slidably supported in the central bore 43 of the portion 20 is a stem 44. This stem is centrally apertured as at 45 and slidable therein is the rod 14. The lower end of this stem member 44 has press fitted or otherwise secured thereon, the male die portion 46. It—see Fig. 3—is spaced from the lower face of the portion 21 by about $\frac{3}{32}$ ".

The upper end of the stem 44 has suitably secured to it as at 47 a flanged sleeve 48 provided with the flange 49 and the end portion 50. The latter also is apertured as at 51 to permit the rod 14 to slide therethrough. Portions 48, 49 and 50 constitute the thimble. A heavy coil spring 52 is interposed between flange 49 of the thimble and the lower face of the base portion 10 of the plunger structure. It normally constrains the thimble away from the base structure 10, as shown in Fig. 3.

Reference will now be had more especially to Figs. 2 and 3. In Fig. 2, the numeral 53 indicates the bed of the machine apertured at 54. Suitably secured thereto as at 55 is the flange portion 56 of the female die structure. This extends upwardly as at 57 and is hollowed out as at 58 to form a chamber, the same having external com-

munication through the passages 59. The upper portion of this chamber is closed as at 60 and coaxial therewith is a depending portion 61 threaded as at 62 to receive a lock nut 63 which retains, in the chamber in the annular channel resulting from such formation, an electric heating element structure 64 supplied with energy by the lines 65 which extend through one of the passages 59.

Slidably supported in the central aperture 66 is a plunger element 70. This plunger element has at its lower end a bore 71 threaded as at 72 to adjustably receive the threaded end 73 of a bolt structure 74. The bolt structure 74 has its head portion bearing on the lower face of the stirrup 75 suitably secured as at 76 to the bed of the machine 53 within the chamber 58 of the female die structure. A coil spring 77 bears on the inner face of said stirrup at one and the lower end and the upper end of said spring 77 bears on the lower end of the plunger 70.

The upper end of the female die structure includes a chamber or well 78 complementary in form to the portion 46. Its lower end is elongated into cylindrical formation as at 79. Extending from the exterior and into this well portion are a plurality of radially directed passages 81. These are vent passages. Extending through the female die portion in outwardly and upwardly directions and in radial arrangement, are a plurality of other passages 82. These passages at their inner ends communicate as at 83. The upper end of the plunger 70 mounts a head structure 84 laterally enlarged as at 85 and the enlarged or outwardly directed flange portion thereof is suitably apertured as at 86.

In Figs. 1 and 3, the ventilating openings or passages 81 and 82 and the communicating grooves 83 have been intentionally omitted for clearness. The inlet ends of said openings are, however, shown in Fig. 5.

The operation of the device is as follows:

A disc of paper board stock of the desired character and indicated by the letter "A" is placed upon the upper surface 90 of the female die, the latter immediately adjacent said surface being annularly reduced or relieved as at 91—see Fig. 3—for reception of the lower end of the collar portion or skirt forming ring 31 in final plate formation operation. The rod 45 bears on the upper surface of the sheet A when the male die is positioned immediately adjacent the female die, as shown in Fig. 3. The lower face of the paper plate rests upon the head portion 84 of the plunger 70. Thus, the plate is localized centrally. At the same time the sleeve 26 at its lower end 26a rests upon the plate in spaced relation to the central engagement while the underface of the paper board plate is engaged by the surface 90 in registration with the face 26a. The skirt forming collar 31 rides on the edge of the plate solely due to gravity.

As the upper die is brought down, the head portion 46 forces its way into the well and at the same time carries with it the paper board stock and this is permitted because only springs 41 and gravity operate on the two concentric sleeve arrangements that hold the plate on the annular surface 91. Near the end of this movement the upper ends of the pins 36 engage the lower face of the portion 16 and thus the outer skirt-forming ring is caused to move relative to the intermediate ring 26. This position is not illustrated in the drawings.

Immediately thereafter, continued movement of the die structure, one toward the other, causes the plate at its well portion to be firmly gripped between the portion 46 and well surface in the female die. Continued movement of the die then causes the portion 16 to move downwardly into contact, as shown in Fig. 1, with the top of the portion 46. In this same movement or rather at the end thereof, the top of the intermediate ring 26 may engage the underface of the portion 16 or the travel may be limited by the bolts 28. Also, contemporaneously with this movement through the pins 39, the remainder of the relative travel of the outer or skirt forming ring relative to the intermediate ring is effected.

The resulting operation is as follows:

The first step is the positioning and gripping of the paper disc. The second step is the well formation and the arranging of the stock in the well portion so as to have a minimum amount of wrinkling. The third step is the initial formation of the skirt portion on the rim and the fourth, and final step in the formation of the plate, is the ironing out of all of the irregularities in the skirt, rim and well portions of the plate. This also is the holding, curing and deodorizing position.

It is also to be understood that the heating elements are energized for heating both the male and female heads. It is also to be understood that when calendered stock is utilized, the calendered face thereof is positioned uppermost. If the stock is tempered, and it usually is, the application of heat not only irons the stock but dries it out in the held shape. In this drying operation the gases or rather the steam generated incident to the drying operation, escapes through the passages before described. This steam as it discharges carries with it any and all objectionable odors and the like.

Following the formation of the plate as described, the male die is elevated and in the event the plate moves upwardly with the male die, the weight of the rod 14 and its nut 15 is sufficient to insure gravity actuation so it will drop relative to its position, as shown in Fig. 1, and cause the plate to be discharged therefrom if the plate adheres to the elevating die. In the event the plate does not elevate with the male die but remains seated in the female die upon elevation and separation of the male die, immediately upon sufficient clearance being effected between dies, the spring 77 becomes effective and the plunger 70 is correspondingly elevated until the previously formed plate is elevated out of the well structure and is positioned in a plane substantially parallel to the top of the female die, from which position it may be removed by hand or mechanically through means not illustrated, since such an arrangement is common in the industry.

The means for feeding the discs relative to the die structure and localizing or centralizing the same relative thereto, has been omitted intentionally, since such instrumentalities are well known in the paper board plate industry.

The foregoing apparatus, therefore, is an example of mechanism arranged to form a plate having the characteristics described and from stock of the character described and in a manner set forth in the foregoing, the basic invention herein being the apparatus for practicing the same.

While the invention has been described in great detail in the foregoing specification, the

same is intended solely for illustrative purposes and not in any sense to be construed as restrictive in character. The many modifications of the invention as herein disclosed which will readily suggest themselves to persons skilled in this art, are all considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:

1. Paper plate forming apparatus including a female die arrangement and a male die arrangement, one arrangement being movable toward and away from the other for plate formation, the male arrangement including a central portion and two sleeve portions about the central portion and movable relative thereto, one sleeve portion enveloping the other sleeve portion, the female arrangement including a well portion for reception of the central portion, an adjacent surface portion for cooperation with the inner sleeve portion and having a relieved portion adjacent said last mentioned surface portion for cooperation with the outer sleeve portion, the said adjacent surface portion and the said inner sleeve portion forming a rim on the plate, and the relieved portion and the outer sleeve portion forming a downturned skirt on the rim periphery, the plate being completely formed from flat paper board stock in a single relative movement between the arrangements, the inner and outer sleeve portions each having telescopic movement relative to said central portion and normally constrained toward operative engagement with the female arrangement, the outer sleeve portion being carried by the inner sleeve portion and having movement independent thereof.

2. Paper plate forming apparatus including a female die arrangement and a male die arrangement, one arrangement being movable toward and away from the other for plate formation, the male arrangement including a central portion and two sleeve portions about the central portion and movable relative thereto, one sleeve portion enveloping the other sleeve portion, the female arrangement including a well portion for reception of the central portion, an adjacent surface portion for cooperation with the inner sleeve portion and having a relieved portion adjacent said last mentioned surface portion for cooperation with the outer sleeve portion, the said adjacent surface portion and the said inner sleeve portion forming a rim on the plate, and the relieved portion and the outer sleeve portion forming a downturned skirt on the rim periphery, the plate being completely formed from flat paper board stock in a single relative movement between the arrangements, the inner sleeve portion having telescopic movement relative to the central portion and normally constrained toward operative engagement with the female arrangement, the central portion of the male arrangement being of dual and concentric character, the inner portion thereof having movement relative to the outer portion thereof, and means yieldingly constraining the inner central portion toward one position, said inner central portion being movable in an opposite direction to another position when the well and central portions have operative engagement and by reason thereof.

3. Paper plate forming apparatus including a female die arrangement and a male die arrangement, one arrangement being movable toward and away from the other for plate formation, the male arrangement including a central por-

tion and two sleeve portions about the central portion and movable relative thereto, one sleeve portion enveloping the other sleeve portion, the female arrangement including a well portion for reception of the central portion, an adjacent surface portion for cooperation with the inner sleeve portion and having a relieved portion adjacent said last mentioned surface portion for cooperation with the outer sleeve portion, the said adjacent surface portion and the said inner sleeve portion forming a rim on the plate, and the relieved portion and the outer sleeve portion forming a downturned skirt on the rim periphery, the plate being completely formed from flat paper board stock in a single relative movement between the arrangements, the outer sleeve portion having telescopic movement relative to the central portion and normally constrained toward operative engagement with the female arrangement, the central portion of the male arrangement being of dual and concentric character, the inner portion thereof having movement relative to the outer portion thereof, and means yieldingly constraining said inner central portion toward one position, said inner central portion being movable in an opposite direction to another position when the well and central portions have operative engagement and by reason thereof.

4. Paper plate forming apparatus including a female die arrangement and a male die arrangement, one arrangement being movable toward and away from the other for plate formation, the male arrangement including a central portion and two sleeve portions about the central portion and movable relative thereto, one sleeve portion enveloping the other sleeve portion, the female arrangement including a well portion for reception of the central portion, an adjacent surface portion for cooperation with the inner sleeve portion and having a relieved portion adjacent said last mentioned surface portion for cooperation with the outer sleeve portion, the said adjacent surface portion and the said inner sleeve portion forming a rim on the plate, and the relieved portion and the outer sleeve portion forming a downturned skirt on the rim periphery, the plate being completely formed from flat paper board stock in a single relative movement between the arrangements, the inner and outer sleeve portions each having telescopic movement relative to the central portion and normally constrained toward operative engagement with the female arrangement, the outer sleeve portion being carried by the inner sleeve portion and having movement independent thereof, the central portion of the male arrangement being of dual and concentric character, the inner portion thereof having movement relative to the outer portion thereof, and means yieldingly constraining said inner central portion toward one position, said inner central portion being movable in an opposite direction to another position when the well and central portions have operative engagement and by reason thereof.

5. Paper plate forming apparatus including a female die arrangement and a male die arrangement, one arrangement being movable toward and away from the other for plate formation, the male arrangement including a central portion and two sleeve portions about the central portion and movable relative thereto, one sleeve portion enveloping the other sleeve portion, the female arrangement including a well portion for reception of the central portion, an adjacent surface portion for coopera-

tion with the inner sleeve portion and having a relieved portion adjacent said last mentioned surface portion for cooperation with the outer sleeve portion, the said adjacent surface portion and the said inner sleeve portion forming a rim on the plate, and the relieved portion and the outer sleeve portion forming a downturned skirt on the rim periphery, the plate being completely formed from flat paper board stock in a single relative movement between the arrangements, the inner and outer sleeve portions each having telescopic movement relative to the central portion and normally constrained toward operative engagement with the female arrangement, the outer sleeve portion being carried by the inner sleeve portion and having movement independent thereof, each arrangement being chambered, said well portion including a plurality of ventilating passages, and means for heating the arrangement and positioned in the respective chambers thereof.

6. Paper plate forming apparatus including a female die arrangement and a male die arrangement, one arrangement being movable toward and away from the other for plate formation, the male arrangement including a central portion and two sleeve portions about the central portion and movable relative thereto, one sleeve portion enveloping the other sleeve portion, the female arrangement including a well portion for reception of the central portion, an adjacent surface portion for cooperation with the inner sleeve portion, and having a relieved portion adjacent said last mentioned surface portion for cooperation with the outer sleeve portion, the central portion of the male arrangement being of dual and concentric character, the inner portion thereof having movement relative to the outer portion thereof, and means yieldingly constraining the central portion toward one position, said central portion being movable in an opposite direction to another position when the well and central portions have operative engagement and by reason thereof.

7. Apparatus as defined by claim 1, characterized by the well portion including a plurality of ventilating passages extending from the board engaging surface thereof and the well surface having grooves therein connected at opposite ends to the well surface ends of the passages.

8. Apparatus as defined by claim 2, characterized by the well portion including a plurality of ventilating passages extending from the board engaging surface thereof and the well surface having grooves therein connected at opposite ends to the well surface ends of the passages.

9. Apparatus as defined by claim 3, characterized by the well portion including a plurality of ventilating passages extending from the board engaging surface thereof and the well surface having grooves therein connected at opposite ends to the well surface ends of the passages.

10. Apparatus as defined by claim 4, characterized by the well portion including a plurality of ventilating passages extending from the board engaging surface thereof and the well surface having grooves therein connected at opposite ends to the well surface ends of the passages.

11. Apparatus as defined by claim 6, characterized by the well portion including a plurality of ventilating passages extending from the board engaging surface thereof and the well surface having grooves therein connected at opposite ends to the well surface ends of the passages.

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