

No. 843,854.

PATENTED FEB. 12, 1907.

F. W. WATERMAN.  
MACHINE FOR PRESS FORMING FIBER DISHES.

APPLICATION FILED FEB. 2, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

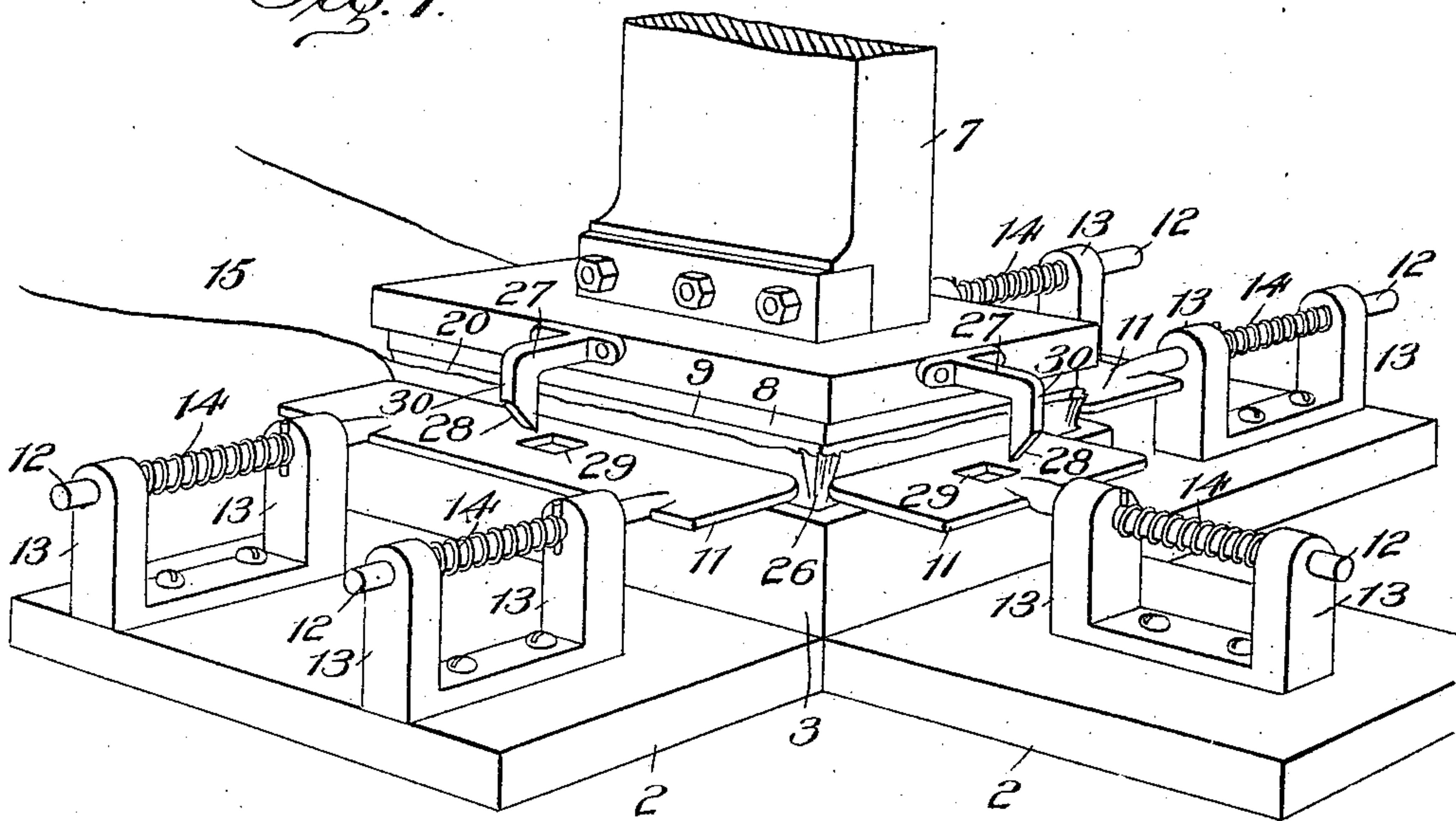
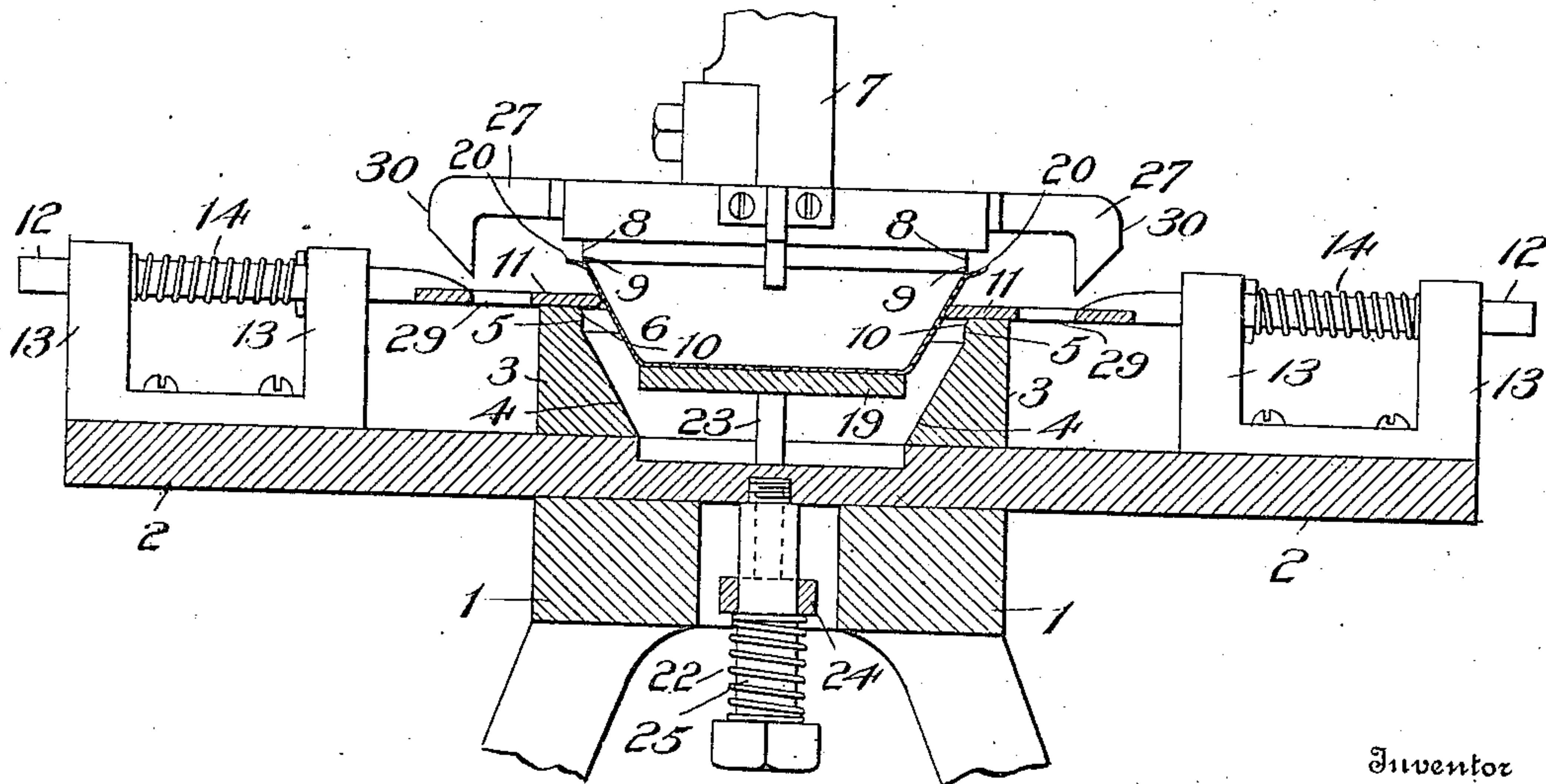


Fig. 3.



Witnesses

Edwin K. Bradford  
Anne B. Johnson

Inventor

Frank W. Waterman

By

Johnson & Johnson

Attorneys

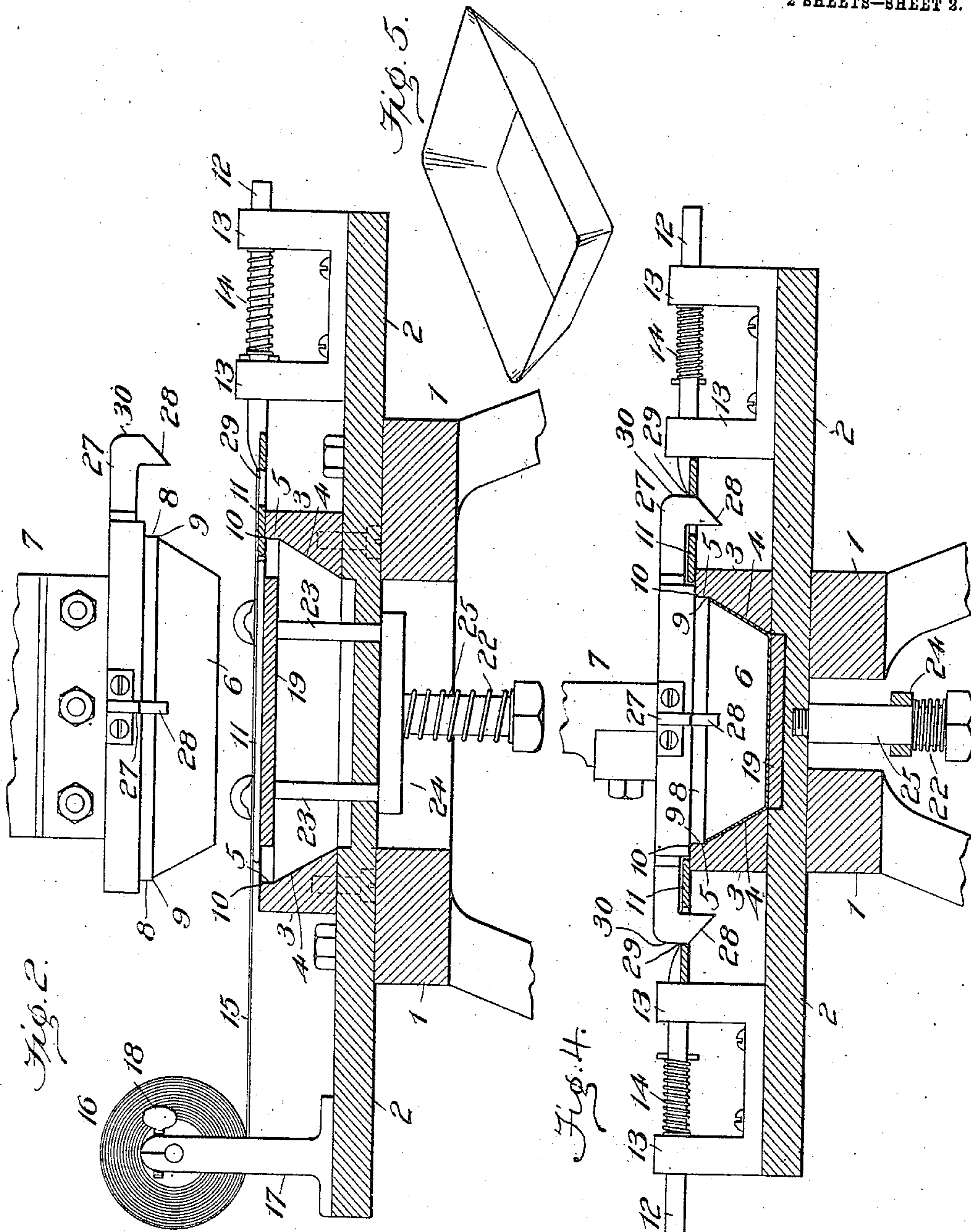
No. 843,854.

PATENTED FEB. 12, 1907.

F. W. WATERMAN.  
MACHINE FOR PRESS FORMING FIBER DISHES.

APPLICATION FILED FEB. 2, 1906.

2 SHEETS—SHEET 2.



Witnesses

Edwin L. Bradford  
Anne B. Johnson

Inventor

Frank W. Waterman

By

Johnson & Johnson

Attorneys



# UNITED STATES PATENT OFFICE.

FRANK WINDER WATERMAN, OF BALTIMORE, MARYLAND, ASSIGNOR TO  
CONTINENTAL JAR AND BOTTLE STOPPER COMPANY, OF BALTIMORE,  
MARYLAND, A CORPORATION OF WEST VIRGINIA.

## MACHINE FOR PRESS-FORMING FIBER DISHES.

No. 843,854.

Specification of Letters Patent.

Patented Feb. 12, 1907.

Application filed February 2, 1906. Serial No. 299,138.

*To all whom it may concern:*

Be it known that I, FRANK WINDER WATERMAN, a citizen of the United States, residing at Baltimore city, and State of Maryland, have invented certain new and useful Improvements in Machine for Press-Forming Fiber Dishes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention which forms the subject of this patent is directed to the production of a machine adapted for making fiber dishes or trays of angular form and wherein a fixed chambered and a movable conical die are caused to coöperate with spring-pressed plates slidably mounted on the top of the chambered die, whereby as the blank-sheet is forced into the die-chamber the pressure of said plates upon the blank will cause the fullness or surplus therein to be worked or pushed to the corners or angles as crimps, which under the pressure and action of the dies and plates are caused to be smoothed down and embedded and welded in the corners, thereby making the dish free from wrinkles, reinforcing and causing the stiffening and strengthening of the corners, the side walls, and the dish. For this purpose the spring-pressed plates are arranged to slidably rest upon the top shearing edges of the fixed die member with the plate normally overhanging the shearing edges of the fixed die, and in order to move them out of the way of the shearing action on the sheet, caused by the descent of corresponding shearing edges of the upper die, I provide the upper die with wedge brackets fixed to and depending from the upper die in positions to engage the said supporting-plates to push them back or outward by the descent of the die and to hold them out of the way to allow the shearing action of the dies on the sheet as it is being formed into the tray. In their outward positions the spring-pressed plates are held until the tray is formed and the upper die raised sufficiently to allow the formed tray to be ejected, when the wedge brackets are thereby raised free of engagement with the spring-pressed plates, allowing them to automatically resume their normal positions for a repetition of the operation on another blank. In this opera-

tion of the dies the blank-sheet from which the dish is to be formed may be provided from a roll mounted at one end of the dies and from which roll the descent of the die causes the sheet to be clamped upon a spring-sustained bottom and fed into the fixed die-chamber and to be severed from the roll at the limit of such descent. The material for the dishes is known in the trade as "sulfite pulp" of the thickness and character of paper, giving the dish when produced a clean sanitary character, rendering it water and acid proof and adapted to contain liquids, chow-chow, jellies, butter, lard, acids, and other like substances.

The accompanying drawings illustrate my improved fiber-dish-forming machine, and in which—

Figure 1 shows in perspective fixed and movable dies provided with my invention and in which is shown a dish as being under the forming action of the dies, the blank-sheets for which being provided from a roll mounted on one end of the die-supporting base. Fig. 2 is a vertical longitudinal section of so much of the press as shows the movable die raised and the fiber sheet drawn from the roll and laid upon the spring-pressed plates over the chamber of the fixed die in position to be pressed within its dish-forming chamber by the descent of the upper die. Fig. 3 is a vertical transverse section of the dies in the position the movable die occupies in the partial formation of the dish and showing the plates as pressing the raised walls of the sheet against the conical walls of the descending die and the latter pressing the bottom of the sheet upon a spring-sustained bottom of the fixed die-chamber. Fig. 4 is an identical section showing the dies in the positions they occupy when the dish or tray has been formed. Fig. 5 shows the angular dish as produced.

A bolster 1, suitably supported, has firmly secured upon it a base-timber 2, upon which the lower or fixed member 3 of the dies is firmly bolted, and has the form of a rectangular frame having interior upward-flaring walls 4, forming a hollow frustrum of an inverted cone, which for a short distance terminate in vertical shearing-walls 5 at its top and constitutes the hollow die or press member within and upon the flaring walls of



which the dish is formed. The upper or movable die member is a solid block 6, firmly fixed to a head 7, carried by the side of the press and is the exact counterpart of the forming-chamber of the fixed die member. This die-block is supplemented by a rectangular shoulder 8, which overhangs the walls of the die-block and forms, with the vertical walls 5 of the lower die, movable and fixed shearing members 9 and 10, which as the die member is moved down causes the overhanging shearing steel shoulder 8 to enter the top of the fixed die member and by its cutting edge 10 coact with the overhanging vertical edge 9 to shear or cut the sheet from the roll at the feed end of the dies and to trim off the surplus material around the edges as the die moves to its limit within the fixed forming-chamber. The movable die carries with it the sheet and completes the formation of the dish under pressure of the conical walls of the movable die upon the flaring walls of the chamber of the fixed die. In this operation the corners or angles of the dish are reinforced, stiffened, and strengthened by having transferred to them the surplus material, which the sinking of the bottom of the dish causes to form in crimps or folds at the ends of the sheet, and the way and the means by which these crimps or folds are transferred or crowded to the corners I will now describe.

At each longitudinal side and at one end of the fixed die-chamber is arranged a plate 11 independable slidable upon the top of said die and carried by a stem 12, mounted in supports 13, each stem being provided with a spiral spring 14, exerting a constant force to press the plates inward to a limit which is a short distance within and overhanging the cutting edges 10 at the top of the fixed die for a purpose presently stated. The blank 15 is preferably fed from a dampened roll 16, mounted in bearings in standards 17 at one end of the fixed die, so that the sheet can be unrolled and laid over the die-chamber upon the slidable plates. The bearing ends of these standards may be split from the bearing to their upper ends and provided with screws 18 or other means for clamping the split parts to adjust the friction on the shaft of the paper-roll for a purpose presently stated. The required length from the roll having been pulled off and laid over the die-chamber upon the slidable plates the block-die is caused to descend upon and clamp the sheet upon a spring-sustained bottom 19 and hold the sheet between the edges of the spring-sustained slidable plates and prevent the sheet from slipping. The continued descent of the die will carry the sheet and the spring-sustained bottom down into the die-chamber, so that the side portions of the sheet resting against the edges of the spring-pressed plates will be caused by the conical walls of the die to be turned up, while the

plates will support the turned-up edges 20, and thereby cause the upturned edges of the dish to be kept comparatively smooth by causing the crimps or folds which would be produced by the corner-bends to be forced or crowded toward the corners and for this purpose the length of the spring-pressed plates are about equal to the length and width of the dies. The die-chamber is closed by a spring-sustained bottom 21, the normal position of which is level with the top of the chamber, so that the continued descent of the die with the dish being formed will depress the bottom against the force of its spring 22 until the die reaches the limit of its descent, forcing the upturned sides of the dish hard against the meeting walls of the movable and fixed die members. During this operation the tension put upon the roll will serve to keep that end of the dish-blank smooth and cause the crimps or folds to be drawn into the corners when the sheet is severed, and it will be understood that the shearing action of the dies severs the sheet from the roll as the steel shoulders 9 enters the walls of the forming-chamber. The bottom of the forming-chamber is supported by a pair of guide-rods 23 and an evener-bar 24, slidably mounted upon a central stem 25, fixed to and depending from the supporting-base of the fixed die member and having a spring 22, by which the bottom is maintained in its normal position to receive the blank and support it as it is being formed in the die-chamber, and the purpose of this spring-sustained bottom is to cause the bottom of the dish to be smoothly formed under the compressing action of the spring-pressure and to cause the finished dish to be raised out of the die-chamber as the die is withdrawn by the expansive force of the spring.

Obviously the material may be supplied in single dampened sheets to the die-chamber; but when the feed of the sheet is from the roll under tension the spring-sustained bottom will serve to clamp the sheet to the bottom of the die, and thereby prevent the sheet from being drawn from beneath the die in its descent and in drawing the sheet into the die under the tension of the roll.

It is important to note that the descent of the die will force the sheet outward against the spring-pressed plates and that it is this pressure that holds the plates tightly against the upturned outer walls of the sheet that is being forced down between the edges of the plates, and it is this pressing function of the plates, coacting with the pulling descent of the die in forcing the sheet into the die-chamber, that acts to cause the crimps or folds to be shoved to the corners or angles of the dies, as shown at 26 in Fig. 1; but for this pressure upon the outer walls of the upturned sides of the sheet as it is being formed the fiber by reason of its thinness and flexibility



would form into crimps and fold along its sides and render them rough, whereas the external pressure of the spring-pressed plates rubs the crimps out smooth before the final welding pressure of the dies.

Looking at Fig. 2 it is seen that in the normal positions of the spring-pressed plates the shearing action of the dies on the sheet would be prevented but for some means for moving the plates back out of the descending path of the shearing edges of the upper die, and for this purpose the head of the upper die is provided with brackets 27, depending from its sides and terminating in a wedge point 28, with the wedge side outward overhanging the shearing shoulders and adapted to enter and engage corresponding slots 29 in the spring-pressed plates, so that in the descent of the die the wedge sides of the brackets will act in the slots to cause the plates to be pushed or moved back to withdraw the plates out of the vertical path of the shearing-shoulders 9 and to allow them to enter the lower die at its shearing-wall 10 to sever and trim the edges of the sheet. This wedge action in moving the plates back takes place when the cutting or shearing edge is a short distance above the spring-pressed plates, and this allows said plates to hold the sides of the sheet until the cutting edges are about to come into action, and it is at this point that the wedge action is caused to move the plates back out of the way of the shearing edge. The outside edges 29 of these brackets are vertical planes, so that after the wedge part ceases to act the brackets serve to hold the plates in their retracted positions, as in Fig. 4, to allow of the ejection of the formed dish by the spring-pressed bottom as the upper die is being raised.

It is important to note that the evener-bar serves as a stop to limit the normal position of the spring-sustained bottom level with the top of the die, so that it forms a table on which the sheet is clamped by the movable die to hold the sheet in its proper relation to and within the fixed die-chamber as the sheet is being pressed into form. The dampening of the sheet develops the glutinous character of the paper, and the subjecting of the formed dish to a bath of paraffin-wax under heat renders it stiff, tough, and transparent. It is also important to note that while the plates are separately free to be yieldingly pressed inward against the sides of the sheet to smooth the crimps to the corners of the dish as it is being formed the plates in such functions form supplemental dies in shaping the sides of the dish before it is brought in contact under pressure with the side walls of the die, and in such operation the plates yield as the upper die forces the sheet down. This yielding of the plates while being independent of each other is caused to be practically simultaneous, while the retracting move-

ments of the plates to carry them free of the shearing edges of the die-chamber are rendered positive and simultaneous.

I claim—

1. In a machine for press-forming fiber dishes, a fixed chambered die of rectangular form the chamber-walls flaring upward and terminating in shearing edges, a bottom of the chambered die spring-sustained to support the dish-blank on a level with the top of the die-chamber, a vertically-movable conical die having corresponding shearing edges and adapted to press the dish-blank upon the bottom to form the dish within the die-chamber and to depress the bottom during such formation, and spring-pressed plates each forming a straight edge fixed in its relation to the die-chamber supported on top of and at the sides of the die-chamber, each plate normally overhanging the shearing edges of the die-chamber whereby to engage the under side of the dish-blank as it is depressed and force it against the conical die-forming walls, and means adapted to engage and retract the spring-pressed plates to uncover the shearing edges of the die-chamber in the descent of said conical die.

2. In a machine for press-forming fiber dishes, a fixed chambered die of rectangular form the chamber-walls flaring upward and terminating in shearing edges, a movable conical die having corresponding shearing edges, plates slidable horizontally on top of and at the sides of the die-chamber each plate normally overhanging the shearing edges of said chambered die, means consisting of a spring-pressed guide-stem for yieldingly sustaining each plate in being forced outward by the descent of the die, means carried by the movable die whereby in its descent each plate is caused positively to be engaged and moved outward and held to allow the shearing action of the dies.

3. In a machine for press-forming fiber dishes, a fixed chambered die of rectangular form the chamber-walls flaring upward terminating in shearing edges; a movable conical die having corresponding shearing edges, spring-pressed plates slidable horizontally on top of at each side and at one end of the chambered die, each plate normally overhanging the shearing edges of said chambered die, means for yieldingly sustaining each plate in being forced outward by the descent of the die, means carried by the movable die whereby in its descent each plate is caused to engage and be moved outward and held to allow the shearing action of the dies, a roll supported at the other end of the chambered die adapted to contain a roll of paper in position to allow it to be fed therefrom over the die-chamber and caused to be pressed therein from the roll by the descent of the die, and a spring-sustained bottom of the die-chamber adapted to support the pa-



per under the clamping action of the movable die and to descend with it in the die-chamber.

4. In a machine for press-forming fiber dishes, a fixed chambered die of rectangular form the chamber-walls flaring upward terminating in shearing edges, a movable conical die having corresponding shearing edges, spring-pressed plates slidable horizontally on top of at each side and one end of the chambered die, each plate normally overhanging the shearing edges of said chambered die, means for yieldingly sustaining each plate in being forced outward by the descent of the die, means carried by the movable die whereby in its descent each plate is caused to be engaged and moved outward and held to allow the shearing action of the dies, and a roll supported at the other end of the chambered die adapted to contain a roll of paper in position to allow it to be fed therefrom over the die-chamber and caused to be pressed therein from the roll by the descent of the die.

5. In a machine for press-forming fiber dishes a fixed chambered die of rectangular form the chamber-walls flaring upward terminating in shearing edges, a movable die having corresponding shearing edges, a bottom for the chambered die normally spring-sustained on a level with the top of said die-chamber to form a yielding support on which the paper is clamped by the movable die, horizontal plates slidable on top of the chambered die, each plate normally overhanging the shearing edges of the chambered die, means for feeding a continuous sheet of paper to said die upon said plates, means for yieldingly sustaining each plate in its function of forming the dish, whereby the bottom and the sides of the dish are formed under pressure with fullness or crimps compacted or welded in the corners.

6. In a machine for press-forming fiber dishes, a fixed chambered die of rectangular form the chamber-walls flaring upward terminating in shearing edges, a movable die having corresponding shearing edges, a plate slidable horizontally on top of and at the sides of the chambered die, each plate having its edge normally overhanging the shearing edge of said chambered die and provided

with a slot, means for yieldingly sustaining each plate in being forced outward by the descent of the die, and means carried by the movable die adapted to enter and engage the slot of each plate to move it outward by the descent of said die, said means also adapted for holding each plate in its retracted position to allow the shearing action of the dies.

7. In a machine for press-forming fiber dishes, a fixed chambered die of rectangular form the chamber-walls flaring upward terminating in shearing edges, a movable conical die having corresponding shearing edges, a plate slidable horizontally on top of and at the sides of the chambered die, each plate normally overhanging the shearing edge of said chambered die and provided with a slot, means for yieldingly sustaining each plate in its outward movement caused by the descent of the die, brackets projecting from the sides of the movable die, the end of each bracket having a vertical face terminating in a depending wedge point and adapted by the descent of the die to enter the slot of each plate to move it outward and to hold it retracted to allow the shearing action of the dies.

8. In a machine for press-forming fiber dishes, a fixed chambered die of rectangular form the chamber-walls flaring upward and terminating in shearing edges, a movable die having corresponding shearing edges, plates slidably mounted on the top of and at the sides of the die-chamber, each plate normally overhanging the shearing edges of said chambered die and arranged to be forced outward by the descent of the movable die and spring forced inward in forming the dish, a yielding bottom for the chambered die, and means carried by the movable die whereby each plate is caused to be moved outward and held to allow the shearing action of the dies.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK WINDER WATERMAN.

Witnesses:

CHARLES F. HARLEY,  
SADIE B. WATERMAN.