March 27, 1951 E. J. LE CLAIRE 2,546,760

FASTENER FOR PRESSURE DOORS

Filed Sept. 20, 1944 2 Sheets-Sheet 1

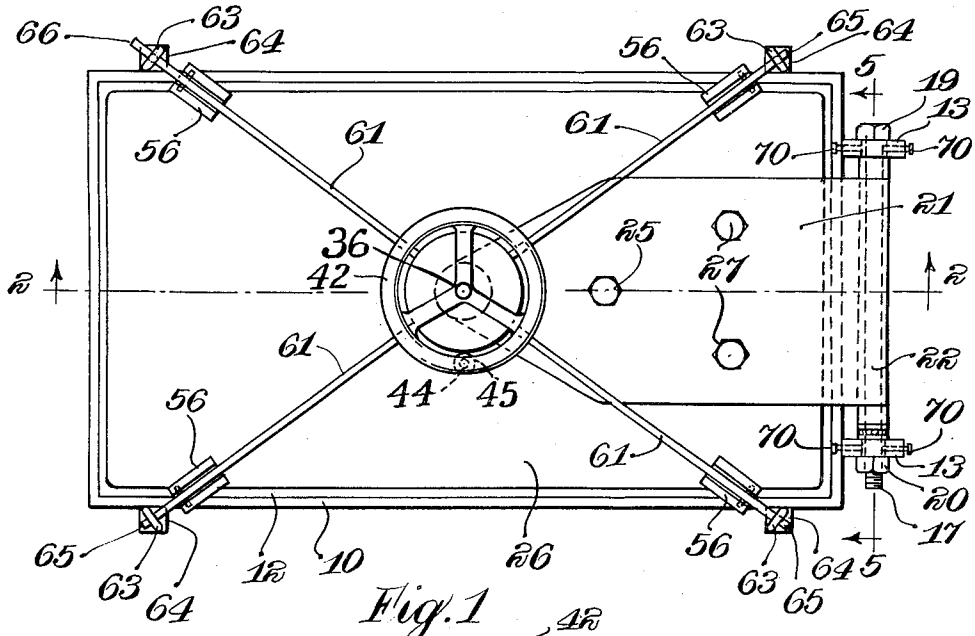


Fig. 1

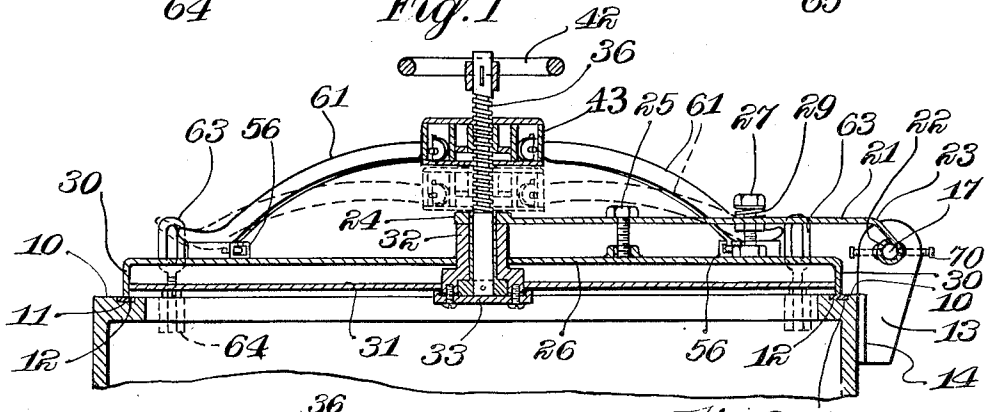


Fig. 2

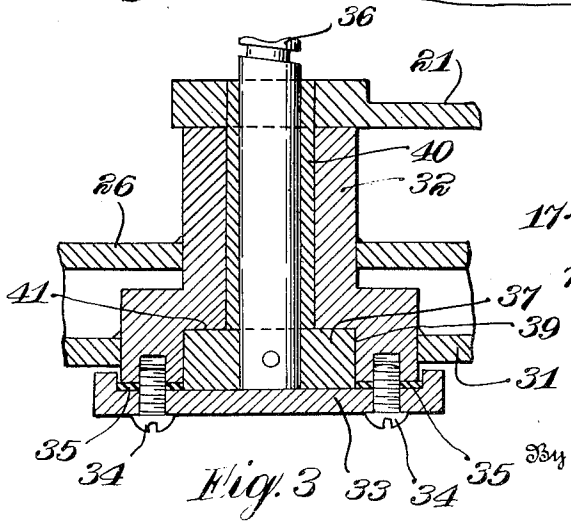


Fig. 3

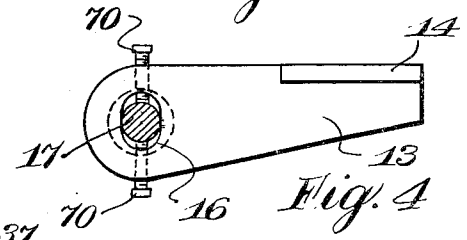


Fig. 4

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FASTENER FOR PRESSURE DOORS

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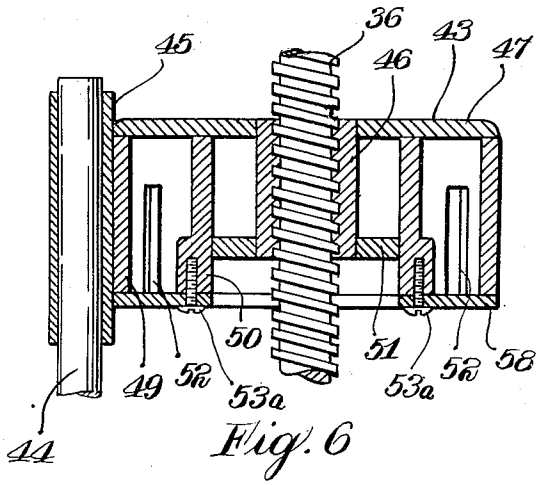


Fig. 6

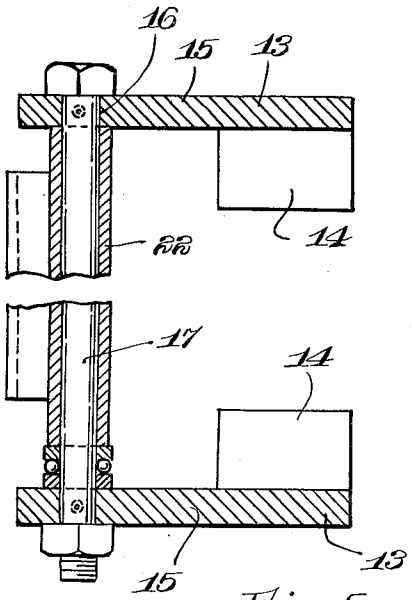


Fig. 5

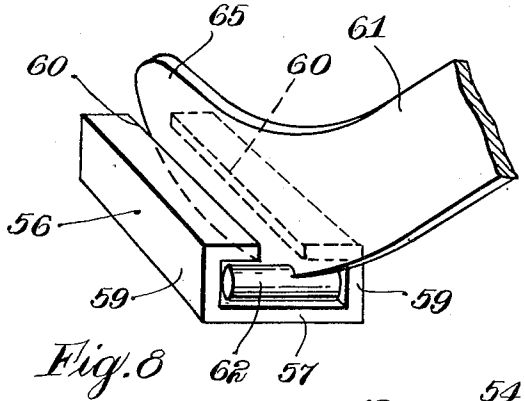


Fig. 8

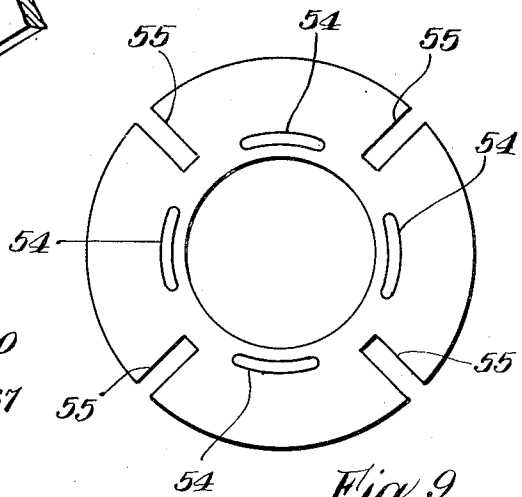


Fig. 9

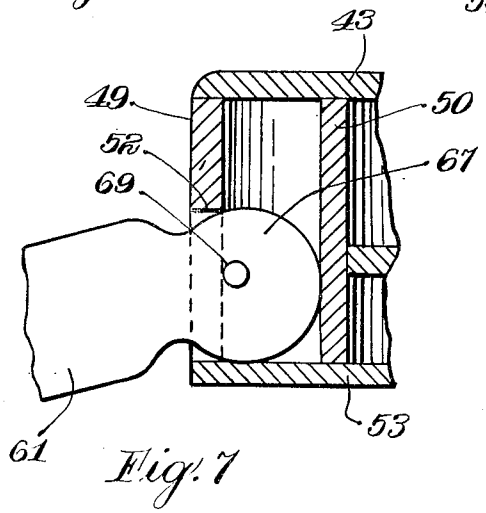


Fig. 7

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FASTENER FOR PRESSURE DOORS

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7 Claims. (Cl. 292—6)

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My invention relates to an improvement in doors and deals more particularly with a type of closure suitable for closing pressure compartments or the like.

In closing chambers on cabinets capable of holding steam, air pressure, or the like, it is desirable that the door and the closure be held against the cabinet at spaced points about its periphery.

The present invention relates to an improved structure of this type capable of sealing a pressure chamber tightly closed.

An object of the present invention is to provide a door carrying a series of locking levers which project in various directions from a central point on the door. Each of these levers is selectively engageable with a cooperable bracket on the door frame so as to produce pressure against the closure at various spaced points about the periphery of the door.

A feature of the present invention lies in the fact that the door may be easily opened or closed. The door is provided with a central threaded post projecting at right angles to the plane of the door closure. A cross-head is threaded upon this post to move toward or away from the door and acts to support one end of each of the levers. The levers are fulcrumed in a track near the outer end of each lever, the pivot or fulcrum of the lever being slidable in the track. The projecting end of each lever is removably engageable with an eye bolt secured to the body of the cabinet. In one extreme position of the cross head the levers are tightly clamped in the eye bolts. In another position of the cross head the levers are entirely withdrawn from the eye bolts, permitting the opening of the door.

A feature of the present invention lies in the hinge construction supporting the door to its frame. The hinge is centrally connected to the door and is adjustably connected thereto between the center of the door and the axis of the hinge so that the position of the door in closing may be adjustably regulated. As a result the closing edge of the door may bear firmly throughout its entire periphery against the door frame.

A feature of the present invention lies in the manner of connecting the levers to the cross head. Each lever is pivotally supported within the above mentioned cross head, but may be readily removed or disconnected therefrom when desired for repair or replacement.

A further feature of the present invention lies in the provision of a pressure door which is rectangular in outline, but which is provided with locking or clamping levers which extend outwardly from a center point on the door. This rectangular door is designed to fit a rectangular housing capable of containing numerous articles for heating, cooking or sterilizing purposes. The rectangular shape of the compartment avoids the waste of space usually accompanying a cooker or sterilizer of cylindrical form.

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These and other objects and novel features of the present invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of my specification:

Figure 1 is a front elevational view of my door showing the construction thereof.

Figure 2 is a transverse section through the door, the position of the section being indicated by the line 2—2 of Figure 1.

Figure 3 is a cross-sectional view of a portion of the door showing the connection between the hinge and the door and showing the support for the threaded post projecting forwardly from the door.

Figure 4 is a detailed view showing the manner in which the supporting hinge may be adjusted.

Figure 5 is a cross-sectional view on the line 5—5 of Figure 1 showing the hinge supporting the door.

Figure 6 is a sectional view through the cross-head supporting the locking levers, the levers having been omitted in this view.

Figure 7 is a sectional view through a portion of the cross-head shown in Figure 6, showing the relationship of the levers to the cross-head.

Figure 8 is a perspective view of the end of one of the levers showing the pivotal and slidable lever connection therefor.

Figure 9 is a detailed view of the inner end of the cross-head shown in Figures 6 and 7, showing the plate which holds the levers in place and also showing the manner in which these levers may be disconnected from the cross-head.

The details of the supporting cabinet are not shown in view of the fact that the present invention deals particularly with the closure therefor. The face 10 of the cabinet is partially shown in Figure 1 of the drawings, and in preferred form the casing of the pressure cabinet is rectangular in general shape, having the door opening covering the major portion of one side thereof.

The cabinet face is grooved at 11 about the periphery of the door edge and a gasket 12 of rubber or other suitable materials is provided in this groove to form a seat for the cabinet door. A pair of brackets 13, best illustrated in Figures

1, 2, 4 and 5 of the drawings, are provided with plates 14 designed for attachment against the side of the pressure cabinet and parallel flanges 15 on the brackets 13 are provided with opposed elongated apertures 16 in axial alignment.

As illustrated in Figure 4 of the drawings the apertures 16 are elongated transversely of the brackets 13. The apertures 16 are designed to accommodate a pivot bolt 17 which supports the door. The bolt 17 is provided with a head 19 which rests upon the uppermost bracket 13. A nut 20 on the lower threaded end of the bolt 17 engages the underside of the lower bracket 13 so as to hold the pivot bolt in place between the two brackets 13.

A hinge strap 21 is provided with a hollow cylindrical journal 22 at one end thereof to fit about the bolt 17. The strap 21 extends forwardly and outwardly from the bolt 17 for a short distance and is bent at the point 23 to extend substantially parallel to the front surface of the door. The free end of the hinge strap 21 is provided with a boss 24 thereupon through which the tightening screw and the locking levers extend, as will be later described in detail. A bolt 25 extends through the hinge strap 21 and is threadably connected to the outer surface 26 of the door. A pair of bolts 27 extend through the hinge strap 21 in vertically aligned relation, these bolts also being threaded to the forward surface 26 of the door. Springs 29 extend between the heads of the bolts 27 and the hinge strap to permit a certain amount of free movement between the door and the hinge strap so that the door may seat properly upon the gasket 12.

The door is provided with an outer surface 26 having a rearwardly extending peripheral flange 30 thereupon which engages the gasket 12 on the door frame. An inner door panel 31 is secured in parallel spaced relation to the outer panel 26 to provide an insulating space and to further strengthen the door construction. As best illustrated in Figure 3 of the drawings, a cylindrical sleeve 32 extends through the outer and inner door panels 26 and 31 and is welded or otherwise secured thereto. A closure plate 33 closes the inner end thereof. Cap screws or bolts 34 clamp the closure plate and the gasket 35 against the sleeve end.

An externally threaded shaft 36 is provided with a collar 37 at its inner end arranged within the enlarged internal diameter portion 39 of the sleeve 32. A shaft bearing 40 is provided within the small diameter portion of the sleeve 32, and a shoulder 41 is provided between the large and small diameter sleeve portions. The collar 37 holds the shaft from removal from the sleeve by bearing against this shoulder 41. The hinge strap 21 encircles the shaft 36 as illustrated in Figure 3 of the drawings and acts to support the door through this shaft and through the bolts 25 and 27.

From the foregoing description, it will be obvious that the threaded shaft 36 may rotate freely in the bearings described and in the bearing sleeve 32. A wheel 42 is secured to the outer extremity of the shaft 36 by means of which this shaft may be rotated. A cross head illustrated in general by the numeral 43 is mounted upon the threaded shaft 36 and moves longitudinally thereof upon rotation of the shaft. The cross head is held from rotation by means of a rod 44 which is secured to the door panel 26 to extend outwardly at right angles therefrom, this rod extending through a sleeve 45 mounted upon the cross head 43 as illustrated in Figure 6 of the drawings. The rod 44 permits the cross head to move longitudinally of the shaft 36, but holds the cross head from rotation.

With particular reference to Figure 6 of the drawings, it will be noted that the cross head 43 includes an internally threaded sleeve 46 which is secured to a top closure disc 47. A pair of spaced concentric sleeves 49 and 50 are integrally secured to the under-surface of the closure disc 47. A ring 51 extends between the sleeves 46 and 50 to reinforce the same. Angularly spaced slots 52 are provided in the outer sleeve 49 communicating with the lower end of this ring. The slots 52 are for accommodating the inner ends of the locking arms in the manner which will be later described.

A ring-shaped lower closure plate 53, best illustrated in Figure 9 of the drawings, is secured to the lower edge of the ring 50 by bolts or cap screws 53*a*. The bolts 53*a* extend through arcuate slots 54 in the closure plate so that the closure plate may be rotated about its axis a limited distance. Angularly spaced notches 55 are provided in this lower closure plate 53 in communication with the outer circumference thereof. The slots 55 are arranged to register with the lower ends of the vertical slots 52 when the closure plate 53 is rotated to the proper position, and in the other extreme position of the closure plate as limited by the slots 54, the lower ends of the slots 52 are closed by the plate 53.

As illustrated in Figures 1, 2, and 8 of the drawings, slide-ways 56 are secured to the outer door plate 26 to extend radially from the center of the door. The slide-ways 56 comprise channels including a base 57, sides 59 and opposed flanges 60. The opposed flanges 60 are spaced to provide a groove therebetween through which a locking arm 61 may extend. A transverse pin 62 is secured to each arm 61 so as to provide a guide for the arm, this pin 62 being slidable longitudinally of the slide-ways 56 and confined within the same. The pins 62 thus form a slidable support for the locking arms, as well as a pivotal fulcrum for these lever arms.

The outer extremities of the lever arms are hook-shaped to engage into elongated eye bolts 63 threadably engaged in lugs 64 secured to the external surface of the pressure cabinet. In the extended positions of the arms the hook shaped ends 65 thereof project through the eye bolts and engage the outer end thereof so as to exert an inward pressure against the pins 62, the slides 56 and accordingly the door plate 26. In the other extreme position the lever arms 61 are retracted from the eye bolts 64 as shown in full lines in Figure 2 of the drawings, permitting the opening of the door.

In preferred form one or both of the arms 61 at the end of the door opposite the hinge is provided with an elongated end 66 which remains engaged with its eye bolt 63 longer than any of the other hook ends 65 remain engaged with their respective eye bolts. The purpose of this elongated end 66 is to insure proper clearance between the hook ends 65 and their respective eye bolts at the hinge end of the door. If the arms 61 are barely disengaged from their eye bolts at the hinge end of the door, the hook ends 65 of the corresponding arms are likely to strike the eye bolts as the door is pivoted into open position. In order to prevent this difficulty one or more of the arms at the opposite end of the door are elongated. As a result the proper clearance is

provided between all of the arms and their respective eye bolts at the time the door is swung open.

Each of the locking levers 61 is provided with a rounded inner end 67 which engages against the sleeve 50 within the cross head 43. A pin 69 extends through the head end 67. Pin 69 is positioned off-set from the center of the rounded head so that as the arm pivots, the distance between the surface of the pin 69 engaging the outer sleeve 49 and the periphery of the rounded head 67 engaging the sleeve 50, always remains constant. The arms 61 fit snugly in place and there is a great amount of play in the connection between these arms and the cross head.

The operation of my door is believed obvious from the foregoing explanation. The door may be adjusted to fit flat against its gasket 12 by proper adjustment of the bolts 25 and 27 and by proper adjustment of the set screws 70 which regulate the position of the hinge bolt 17. The outer end of the door or the end thereof opposite the hinge may be raised or lowered by means of set screws 70 in the brackets 13. The position of the door itself relative to the hinge strap 21 may be adjusted by properly adjusting the bolts 25 and 27. The springs 29 take up any slight variation in the plane of the door as it bears against the gasket. As a result the door may fit flat against its gasket throughout the entire periphery of the closure.

When the door is open the arms 61 are in the position shown in full lines in Figure 2 of the drawings, the cross head 43 being moved away from the surface of the door and toward the shaft operating wheel 42. When the door is in closed position the shaft 36 is rotated in a direction to move the cross head 43 toward the position shown in dotted outline in Figure 2 of the drawings. This action first slides the hook ends 65 and 66 of the arms into their respective eye bolts 63 and then pivots the arms in a manner to exert outward pressure on the ends of the eye bolts and inward pressure at the fulcrum of the locking levers 61. This presses the door against its gasket throughout most of the periphery of the door, forming a tight closure between these elements.

In accordance with the patent statutes, I have described the principles of construction and operation of my door for pressure compartments, and while I have endeavored to set forth the best embodiments thereof, I desire to have it understood that obvious changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A fastener for a pressure door comprising a series of arms emanating from the center of the door toward the extremity thereof in angularly spaced relation, said arms being pivotally and slidably secured intermediate the ends thereof to said door, a cross head engageable with said arms to pivot the same in unison, said cross head including a pair of coaxial radially spaced sleeves, said arms extending through slots in the outermost of said sleeves and engaging against the innermost of said sleeves, and a pin extending through the end of each arm within said cross head to hold the arm engaged in its slot.

2. A fastener for a pressure door comprising a series of arms emanating from the center of the door toward the extremity thereof in angularly spaced relation, said arms being pivotally and slidably secured intermediate the ends thereof to said door, a cross head engageable with said arms to pivot the same in unison, said cross head including a pair of coaxial sleeves, said arms extending through slots in the outermost of said sleeves and engageable against the innermost sleeve, a pin through each of said arms engageable against the inner surface of the outer sleeve to hold each arm engaged with the cross head, and a closure plate extending between said sleeves and secured thereto for limited rotation, said closure plate including slots through which the inner ends of said arms may extend in one position thereof to remove the arms from the cross head, and holding said inner ends engaged in said cross head in the other extreme position thereof.

3. A fastener for a pressure door comprising a series of radially arranged channel shaped slides having opposed flanges and directed toward a central point on the door, a series of radially extending curved locking arms having transversely extending pivot pins thereon slidably and pivotally supported by said slides beneath said flanges, said slides supporting said arms slidably and pivotally in planes substantially normal to the door, means for pivoting the inner ends of said arms toward said door, and projecting ends on said arms.

4. A fastener for a pressure door comprising a series of angularly disposed locking arms extending toward a central point of one surface of said door, said arms having hook ends curving outwardly from the surface of the door, means slidably and pivotally connecting an intermediate point of said locking levers to said door near the periphery thereof, and means engaging the inner ends of said locking levers to move the same in unison toward the door.

5. A fastener for a pressure door comprising a series of angularly spaced arms emanating from the central point of one surface of said door, hook ends on said arms curving outwardly from the surface of the door, means slidably and pivotally connecting said arms for longitudinal movement relatively to said door, said slidable and pivotal connection being at an intermediate point of said arms, and means engageable with the inner ends of said arms to move said inner ends toward and away from said door, movement of said inner ends of said arms toward said door sliding said levers outwardly and pivoting the outer ends of said arms away from the plane of said one surface of the door.

6. A fastener for a pressure door comprising a series of curved arms arranged in angularly spaced relation and emanating from an intermediate point on said door, radially extending slides on said door, and transverse pins on said arms intermediate the ends thereof engaged in said slides, said arms being slidable and pivotal on radial planes substantially normal to the door, and means on said door for moving the inner ends of said lever arms toward said door, said movement sliding said arms outwardly and pivoting the outer ends of said arms away from said door.

7. A fastener for a pressure door comprising a series of relatively narrow curved arms emanating from an intermediate point on said door, said arms extending in angularly spaced relation, a transversely extending fulcrum at an intermediate point of each arm, slide means pivotally and slidably connecting said fulcrum on said arms to said closure, said arms being slid-

able and pivotal in planes substantially normal to the door, and means on said closure engaging the inner ends of said arms for moving said inner ends toward said door, said means comprising a cross head engaging the inner ends of said arms and movable toward or away from said door, movement of the inner ends of said arms toward said door sliding said arms outwardly and pivoting the outer ends of said arms away from said door.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
357,101	Rowland	Feb. 1, 1887
1,144,152	Miller	June 22, 1915
1,337,733	Sweetland et al.	Apr. 20, 1920
1,659,202	Jewell	Feb. 14, 1928
1,680,332	Jewell	Aug. 14, 1928
1,854,680	Walker, Jr.	Apr. 19, 1932
1,858,013	Heins	May 10, 1932
2,033,305	Roy	Mar. 10, 1936
2,045,303	Ludington	June 23, 1936
2,199,765	Velie	May 7, 1940
2,355,475	Skaller	Aug. 8, 1944

FOREIGN PATENTS

Number	Country	Date
199,986	Great Britain	July 5, 1923