May 17, 1949. A. M. LEWIS ET AL 2,470,174

COLLAPSIBLE BOX

Filed Dec. 22, 1947 3 Sheets-Sheet 1

FIG. 1.

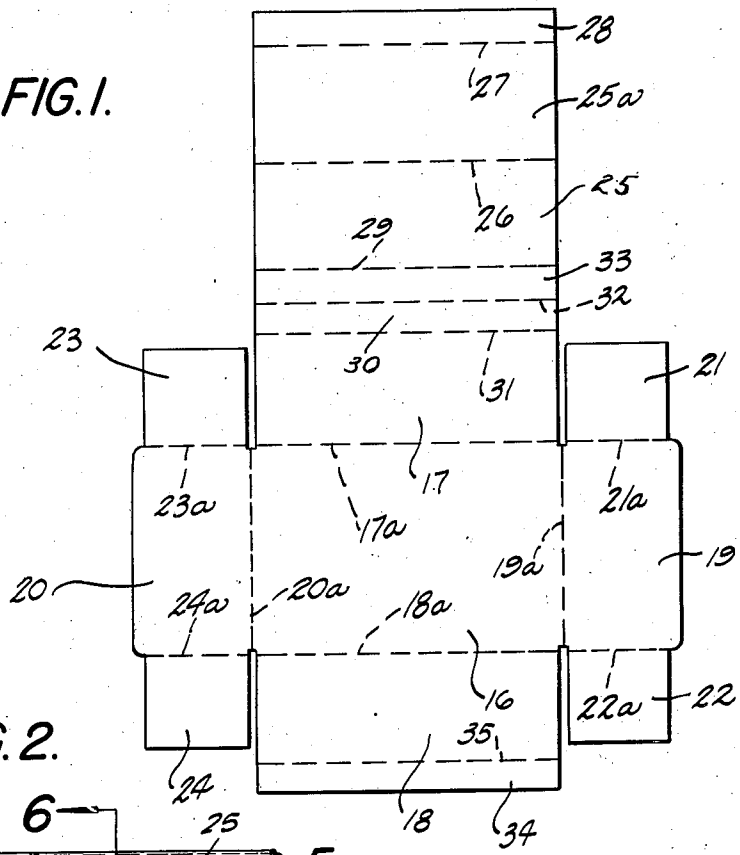


FIG. 2.

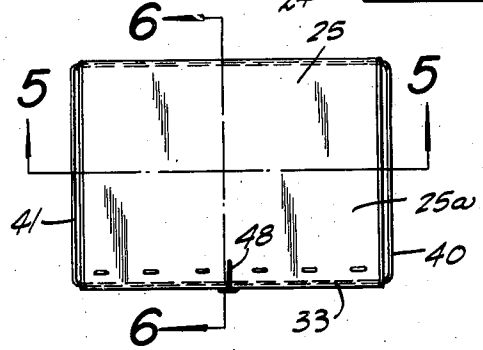


FIG. 4.

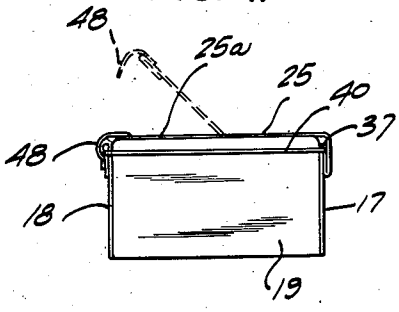
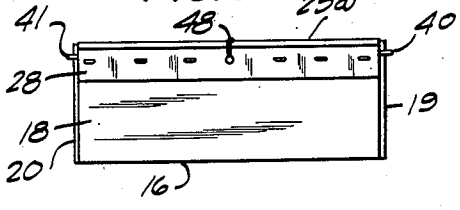


FIG. 3.



INVENTORS.
ALBERT M. LEWIS.
PETER B. WEILER.
BY
Thos. L. Donnelly
ATTORNEY.

May 17, 1949. A. M. LEWIS ET AL 2,470,174

COLLAPSIBLE BOX

Filed Dec. 22, 1947 3 Sheets-Sheet 2

FIG. 5.

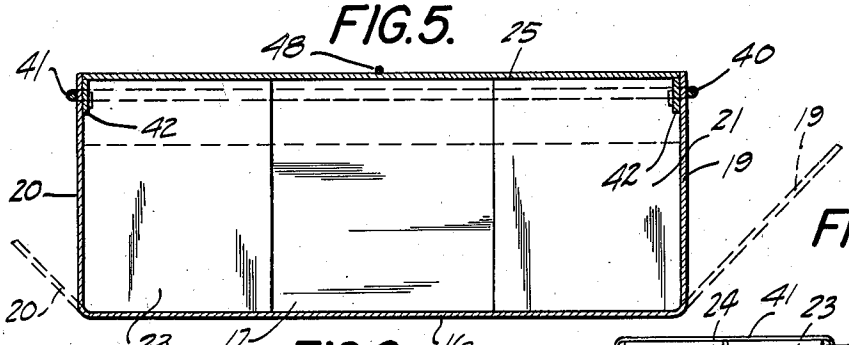


FIG. 7.

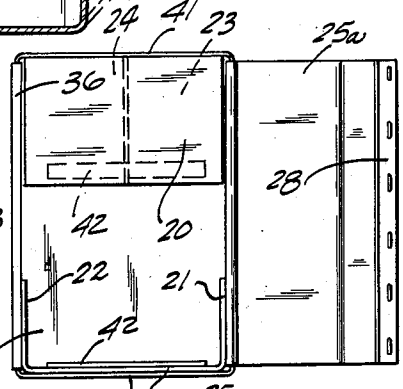


FIG. 6.

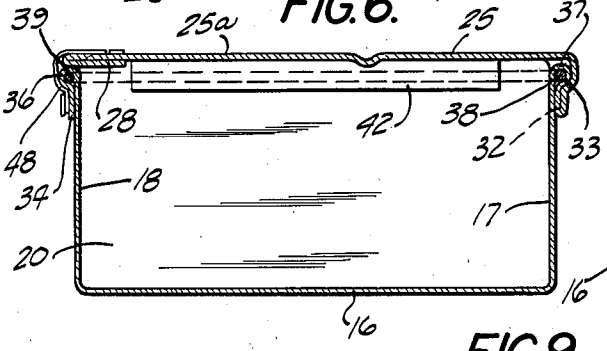


FIG. 9.

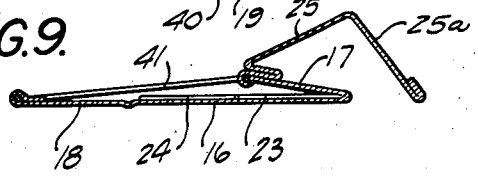


FIG. 8.

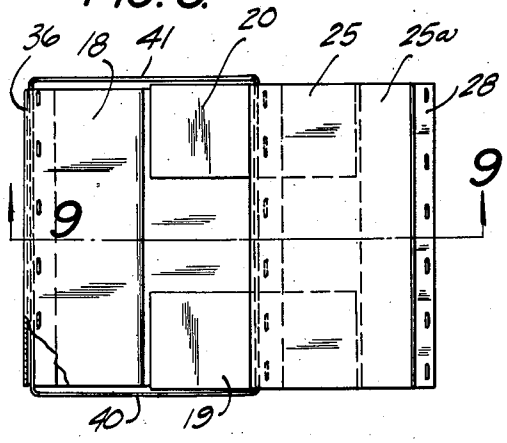
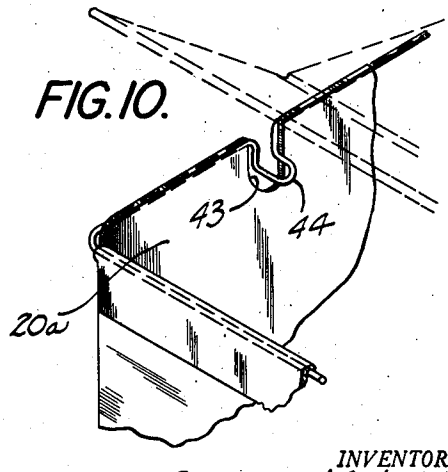


FIG. 10.



INVENTORS.
ALBERT M. LEWIS.
PETER B. WEILER.
BY
Thos. F. Donnelly
ATTORNEY.

May 17, 1949. A. M. LEWIS ET AL 2,470,174

COLLAPSIBLE BOX

Filed Dec. 22, 1947 3 Sheets-Sheet 3

FIG. 11.

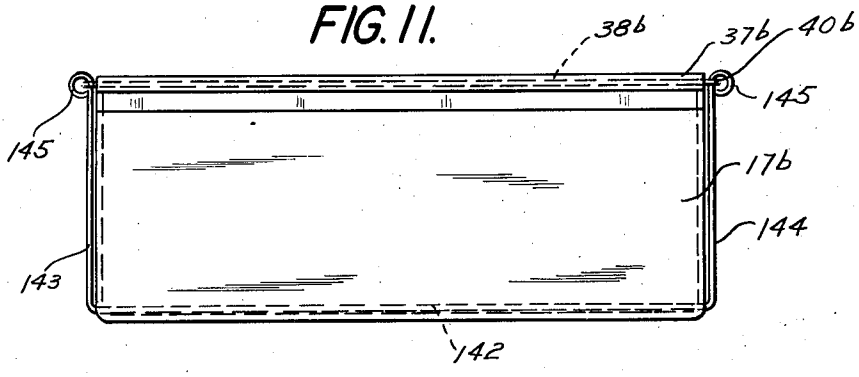


FIG. 12.

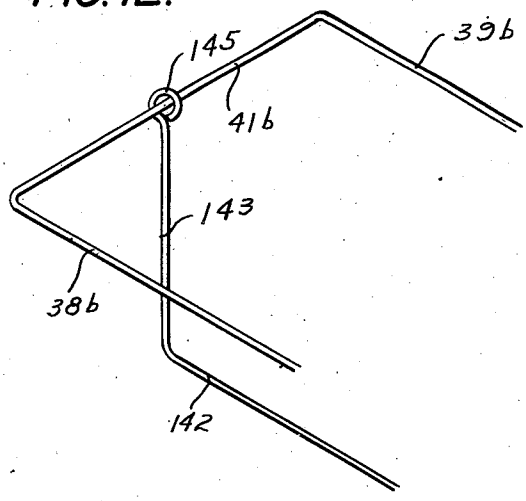
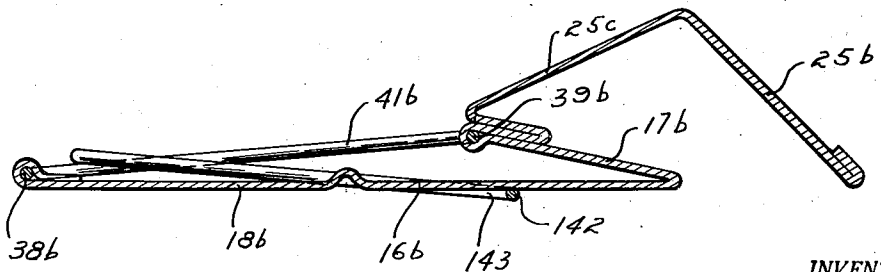


FIG. 13.



INVENTORS.
ALBERT M. LEWIS.
PETER B. WEILER.
BY
ATTORNEY.

Patented May 17, 1949 2,470,174

UNITED STATES PATENT OFFICE

2,470,174

COLLAPSIBLE BOX

Albert M. Lewis and Peter B. Weiler,
Detroit, Mich.

Application December 22, 1947, Serial No. 793,206

5 Claims. (Cl. 229—41)

1

Our invention relates to a new and useful improvement in a collapsible box having side walls, end walls, a top and a bottom which are capable of being extended into a form to provide a box or receptacle and which are also capable of being collapsed upon each other to provide a compact structure.

It is an object of the present invention to provide a box of this class which will be simple in structure, economical of manufacture, durable, compact, light, and highly efficient in use.

Another object of the invention is the provision of a box of this class which may be easily and quickly moved from collapsible form to operative form and which, when moved to operative form, will secure itself against collapse.

Another object of the invention is the provision of a box of this class formed from a single piece of material, preferably cardboard or the like and so arranged and constructed that there is a minimum of open edges on the structure.

Another object of the invention is the provision in a box of this class having a frame to which the oppositely disposed side walls are pivotally connected at their upper edges and which serves as an abutment for the end walls when swung to operative position and which also serves to retain the form in rigid position when in collapsed form and when in operative position.

Another object of the invention is the provision in a box of this class of a structure having a cover so arranged that it may be partly opened or fully opened and so arranged that when in closed position, a downward collapsing of the cover into the box will be prevented.

Other objects will appear hereinafter.

It is recognized that various modifications and changes may be made in the detail of structure illustrated without departing from the invention and it is intended that such shall be embraced within the scope of the claims which form a part hereof.

Forming a part of this specification are drawings in which,

Fig. 1 is a plan view of a blank from which the invention is formed,

Fig. 2 is a top plan view of the invention in operative position,

Fig. 3 is a front elevational view of the invention in operative position,

Fig. 4 is an end elevational view of the invention in operative position,

Fig. 5 is an enlarged sectional view taken on line 5—5 of Fig. 2,

2

Fig. 6 is an enlarged sectional view taken on line 6—6 of Fig. 2,

Fig. 7 is a top plan view of the invention with the covers swung to fully open position and one of the end walls collapsed upon the bottom,

Fig. 8 is a top plan view of the invention showing it in partially collapsed position,

Fig. 9 is a sectional view taken on line 9—9 of Fig. 8,

Fig. 10 is a fragmentary, perspective view illustrating a slight modification,

Fig. 11 is a side elevational view of a slight modification of the invention,

Fig. 12 is a fragmentary, perspective view illustrating the support used in the invention,

Fig. 13 is a sectional view of a modification showing it in partially collapsed form.

As shown in Fig. 1, the blank used is such as to provide a bottom 16 extending outwardly from which are the oppositely disposed side walls 17 and 18 which swing on the scored lines 17*a* and 18*a*, respectively. Extending outwardly from the bottom 16 are end walls 19 and 20 which swing on the scored lines 19*a* and 20*a*, respectively. Extending outwardly from opposite sides of the end wall 19 are the side flaps 21 and 22 which swing on the scored lines 21*a* and 22*a*, respectively. Extending outwardly from opposite ends of the end wall 20 are the side flaps 23 and 24 which swing on the scored lines 23*a* and 24*a*, respectively. The cover is scored, as at 26, so that the cover sections 25*a* and 25 may swing on this line 26. A reenforcing flap 28 is provided for the outer edge of the cover that swings on the scored line 27 so as to overlie the section 25*a* to which it may be secured by rivets, screws, or in any other suitable manner. The cover swings on the scored line 29 and this scored line is at one edge of the strip 30 which swings on the scored line 32. The strip 33 in turn swings on the scored line 31. A reenforcing strip 34 swings on the scored line 35 on the side wall to provide the knuckle 36, shown in Fig. 6. The sections 30 and 33 also provide a knuckle 37.

We provide a wire reenforcing frame embodying the oppositely disposed side rails 38 and 39, the rail 38 being in the knuckle 37 and the rail 39 being in the knuckle 36. The end rails 40 and 41 serve as abutments for the end walls when these end walls are swung into operative position, as clearly shown in Fig. 5, so as to prevent further outward swinging of these end walls. Mounted along the upper edge of the inner surface of each of these end walls 19 and 20 is a reenforcing stripping 42 which serves to reenforce

the open edges of the end walls and, at the same time, serves as an abutment for the cover section which rests thereagainst and prevents the cover sections from being pressed inwardly into the interior of the box when the box is in operative position.

When in operative position, the side flaps 23 and 24 and 21 and 22 are folded inwardly to extend at right angles to the end walls 19 and 20 and engage at their lower edges the bottom 16 and at their faces the inner surfaces of the side walls 17 and 18. These side flaps serve to reenforce the end walls 19 and 20 and prevent their inward collapse onto the bottom 16. It will be noted that these end walls 19 and 20 extend above the end rails 40 and 41 of the frame so that the rails 40 and 41 of the frame serve to limit the outward swinging of the end walls 19 and 20 and thus the end walls are retained in rigid position, the side flaps 23 and 24 and 21 and 22, through their engagement with the inner surface of the bottom 16, serving to retain the end walls 19 and 20 in engagement with the end portions 40 and 41 of this wire frame which is rigid.

The cover section 25*a* may be provided with a suitable flexible member 48 whereby the cover may be tied in closed position. When it is desired to open the cover, the cover section 25*a* may be swung backwardly to lie on the cover section 25, thus leaving only a part of the top of the box open. This is particularly of advantage where it is desired to place the box on a shelf where the height is limited, as in restaurants and the like.

When in upright position, the cover of the box will rest on the upper edge of the reenforcing strips 42 and thus the bending inwardly of the cover at the scored portion 26 will be avoided.

When it is desired to collapse the box, the flaps 21 and 22 would be swung inwardly to engage the inner face of the end wall 19 and, similarly, the flaps 23 and 24 would be swung inwardly to engage the inner face of the end wall 20. When in this condition, these end walls may then be swung inwardly to lie upon the inner surface of the bottom 16. When this has been accomplished, the structure may then be swung to swing the side wall 18 outwardly and the side wall 17 inwardly. When the side wall 17 swings inwardly, it will lie upon the outer faces of the inwardly swung end walls 19 and 20 and in this swinging movement, the upper edges of the side walls 17 and 18 are maintained the same distance apart inasmuch as they are pivotally connected to the side rails of the rigid frame. This position is clearly illustrated in Fig. 8 and Fig. 9. The cover sections 25 and 25*a* are then swung inwardly so that the free edge of the cover will lie substantially flush with the edge of the side wall 18. In this way, the box is easily and quickly collapsed to a compact position which facilitates the storing and transporting of the structure.

In Fig. 10, I have shown a slight modification in which the end wall 20*a* is provided with a slot 43 into which extends the inwardly turned groove 44 formed on the end rail of the wire frame, thus dispensing with the reenforcing strips 42 and the member 44 serving to engage the cover at the scored part to prevent its inward collapse.

It will be noted that at the bottom of the end walls, there is no open seam and that the flaps 23 and 24 and 21 and 22, extending inwardly, serve to protect the open seam which exists between the opposite ends of the end walls and the inner faces of the side walls.

Experience has shown that a box of this type is one which is most highly efficient in use and which is possessed of the various advantages referred to herein. It will be also noted that because of forming the structure from a single blank, the number of open edges is reduced to a minimum so that a durable structure may be provided from heavy cardboard or the like.

In Fig. 11 and Fig. 12 and Fig. 13, I have shown a slight modification in which the box structure is mainly as already described. In this form, the box comprises the bottom 16*b* and the side walls 17*b* and 18*b* which are illustrated in the drawings as set out, particularly in Fig. 13. The cover comprises the sections 25*b* and 26*c*. The wire supporting frame embodying the side rails 38*b* and 39*b* and the end rails 40*b* and 41*b* are used. Experience has shown that with some commodities of a heavy nature, the bottom of the box may sometimes sag and to this end, I have provided a wire embodying the bottom supporting portions 142 and the upstanding arms 143. The member 142 serves as a support for the bottom and serves to reenforce it. Each of these upstanding arms 143 and 144 is provided with an eyelet 145 which embraces one of the end rails above the frame. As shown in Fig. 13, a collapsing of the box still may take place while there is thus provided a means for preventing the bottom from sagging under a heavy load.

What we claim as new is:

1. A collapsible box of the class described, formed from a single sheet of cardboard and comprising: a bottom; a pair of oppositely disposed side walls swingable to extend at right angles to said bottom and to extend parallel thereto; a cover swingable on one of said side walls and embodying a pair of swingable sections; a pair of oppositely disposed end walls swingable to extend at right angles to said bottom and to extend parallel thereto; a wire frame embodying a pair of oppositely disposed side rails and a pair of oppositely disposed end rails, said end rails extending exterior to said end walls and preventing outward swinging of the same and said side rails extending along the upper edge of said side walls; and a knuckle forming member on the upper edge of each of said side walls for swingably connecting the side wall at its upper edge to one of said side rails.

2. A collapsible box of the class described, comprising: a bottom; a pair of oppositely disposed side walls positioned at opposite sides of said bottom and swingable at their lower edges relatively to said bottom for extending at right angles thereto and for lying parallel therewith; a pair of oppositely disposed end walls swingable at their lower edges to the end edges of said bottom and swingable inwardly to extend parallel to said bottom and swingable to extend at right angles thereto; and a side flap on the opposite sides of each of said end walls swingable to extend at right angles thereto and in engagement with the inner face of said side walls and swingable inwardly on the end wall for extending parallel thereto; a frame comprising a pair of oppositely disposed end rails and a pair of oppositely disposed side rails, said end rails extending across said side walls exterior thereof for preventing outward swinging of said end walls and said side rails extending along the upper edges of said side walls; and a knuckle forming

portion on the upper edge of each of said side walls for swingably connecting the upper edge of each of said side walls to one of said side rails.

3. A collapsible box of the class described, comprising: a bottom; a pair of oppositely disposed side walls positioned at opposite sides of said bottom and swingable at their lower edges relatively to said bottom for extending at right angles thereto and for lying parallel therewith; a pair of oppositely disposed end walls swingable at their lower edges to the end edges of said bottom and swingable inwardly to extend parallel to said bottom and swingable to extend at right angles thereto; and a side flap on the opposite sides of each of said end walls swingable to extend at right angles thereto and in engagement with the inner face of said side walls and swingable inwardly on the end wall for extending parallel thereto; a frame comprising a pair of oppositely disposed end rails and a pair of oppositely disposed side rails, said end rails extending across said side walls exterior thereof for preventing outward swinging of said end walls and said side rails extending along the upper edges of said side walls; and a knuckle forming portion on the upper edge of each of said side walls for swingably connecting the upper edge of each of said side walls to one of said side rails; a cover swingably mounted on the upper edge of one of said side walls and swingable over said bottom for engaging the opposite side wall, said cover being scored intermediate its ends to provide a pair of relatively swingable sections.

4. A collapsible box of the class described, comprising: a bottom; a pair of oppositely disposed side walls positioned at opposite sides of said bottom and swingable at their lower edges relatively to said bottom for extending at right angles thereto and for lying parallel therewith; a pair of oppositely disposed end walls swingable at their lower edges to the end edges of said bottom and swingable inwardly to extend parallel to said bottom and swingable to extend at right angles thereto; and a side flap on the opposite sides of each of said end walls swingable to extend at right angles thereto and in engagement with the inner face of said side walls and swingable inwardly on the end wall for extending parallel thereto; a frame comprising a pair of oppositely disposed end rails and a pair of oppositely disposed side rails, said end rails extending across said side walls exterior thereof for preventing outward swinging of said end walls and said side rails extending along the upper edges of said side walls; and a knuckle forming portion on the upper edge of each of said side walls for swingably connecting the upper edge of each of said side walls to one of said side rails; a cover swingably mounted on the upper edge of one of said side walls and swingable over said bottom for engaging

the opposite side walls, said cover being scored intermediate its ends to provide a pair of relatively swingable sections, there being a slot formed in each of said end walls; and an inward projection from each of said side rails projecting through said slot for lying beneath the scoring on said cover for preventing inward collapse of said cover.

5. A collapsible box of the class described, comprising: a bottom; a pair of oppositely disposed side walls positioned at opposite sides of said bottom and swingable at their lower edges relatively to said bottom for extending at right angles thereto and for lying parallel therewith; a pair of oppositely disposed end walls swingable at their lower edges to the end edges of said bottom and swingable inwardly to extend parallel to said bottom and swingable to extend at right angles thereto; and a side flap on the opposite sides of each of said end walls swingable to extend at right angles thereto and in engagement with the inner face of said side walls and swingable inwardly on the end wall for extending parallel thereto; a frame comprising a pair of oppositely disposed end rails and a pair of oppositely disposed side rails, said end rails extending across said side walls exterior thereof for preventing outward swinging of said end walls and said side rails extending along the upper edges of said side walls; and a knuckle forming portion on the upper edge of each of said side walls for swingably connecting the upper edge of each of said side walls to one of said side rails; a cover swingably mounted on the upper edge of one of said side walls and swingable over said bottom for engaging the opposite side walls, said cover being scored intermediate its ends to provide a pair of relatively swingable sections, there being a slot formed in each of said end walls; and an inward projection from each of said side rails projecting through said slot for lying beneath the scoring on said cover for preventing inward collapse of said cover; and means mounted on each of said side rails and extending under said bottom for forming a support for said bottom, said means being swingable on said side rail.

ALBERT M. LEWIS.
PETER B. WEILER.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
306,745	Hamilton	Oct. 21, 1884
589,208	Gareis	Aug. 31, 1897
883,757	Stewart	Apr. 7, 1908
1,103,646	Baddeley	July 14, 1914
1,706,814	Pfister	Mar. 26, 1929