Aug. 21, 1951 J. E. FREEBORN 2,565,218

ADJUSTABLE SCREEN FRAME FOR USE IN SILK SCREEN PRINTING

Filed Jan. 28, 1948 3 Sheets-Sheet 1

FIG. 1.

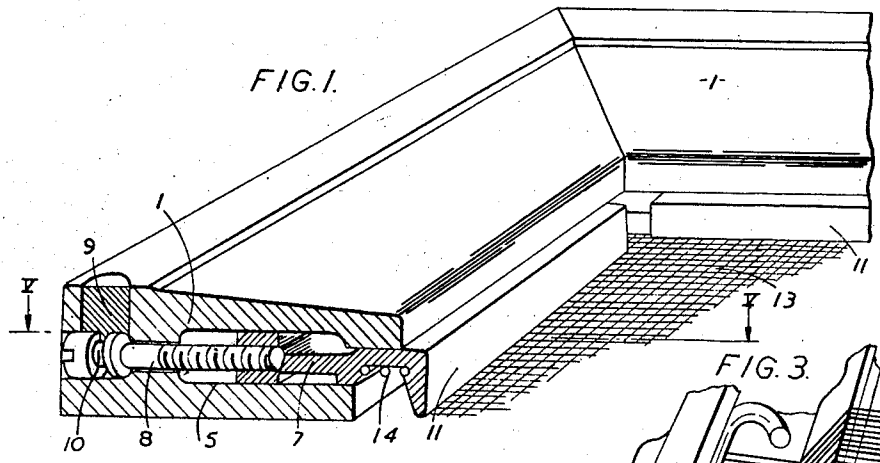


FIG. 3.

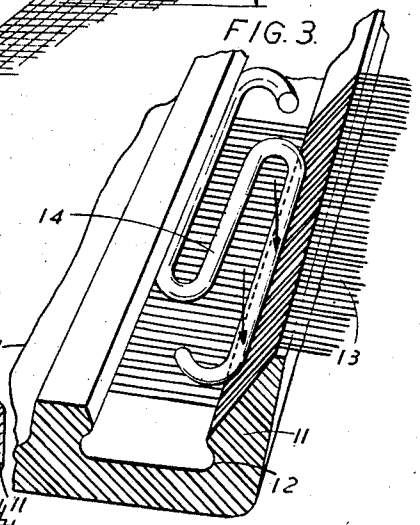


FIG. 2.

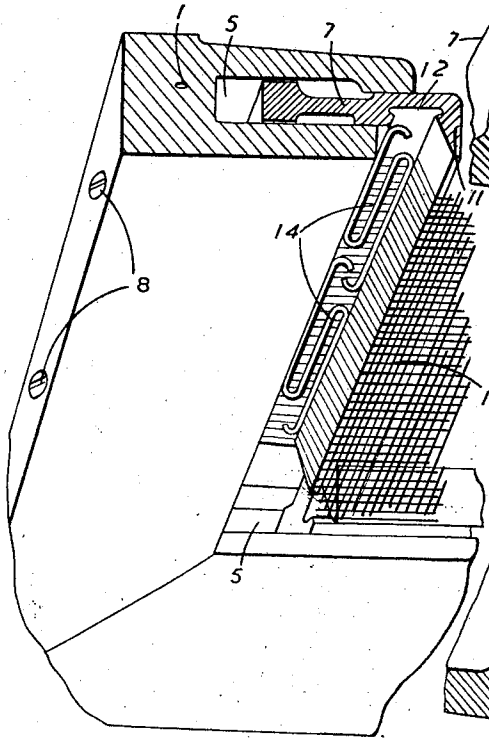
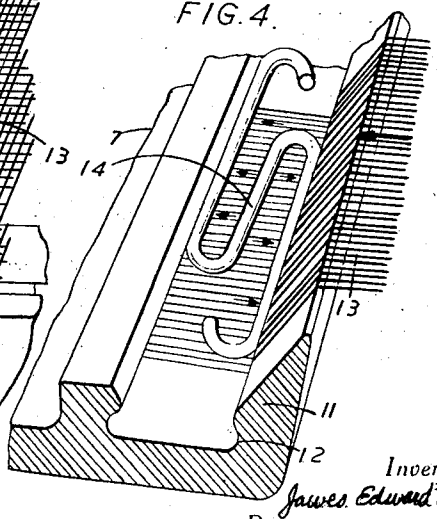


FIG. 4.



Inventor
James Edward Freeborn
By
Michael S. Pinsker
Attorney

Aug. 21, 1951 J. E. FREEBORN 2,565,218

ADJUSTABLE SCREEN FRAME FOR USE IN SILK SCREEN PRINTING

Filed Jan. 28, 1948 3 Sheets-Sheet 2

FIG. 5.

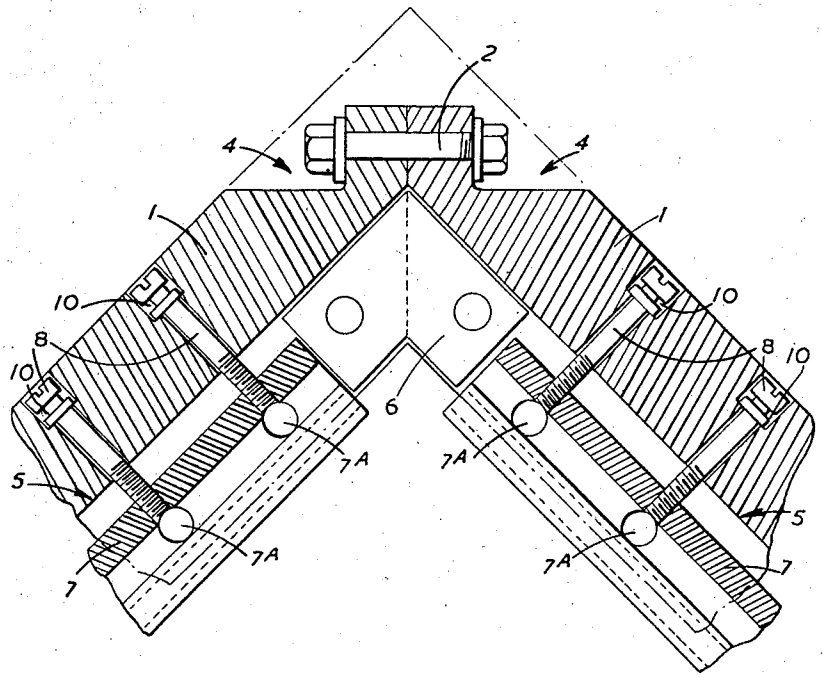
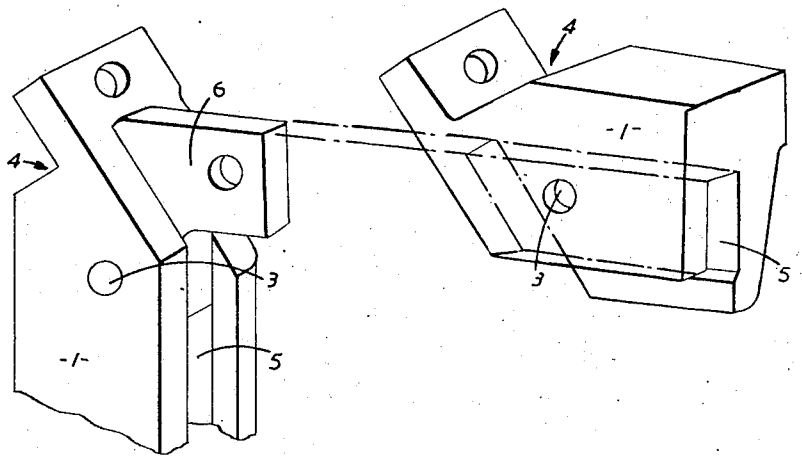


FIG. 6.



Inventor
James Edward Freeborn
By
Michael S. Pinelle
Attorney

Aug. 21, 1951 J. E. FREEBORN 2,565,218

ADJUSTABLE SCREEN FRAME FOR USE IN SILK SCREEN PRINTING

Filed Jan. 28, 1948 3 Sheets-Sheet 3

FIG. 7.

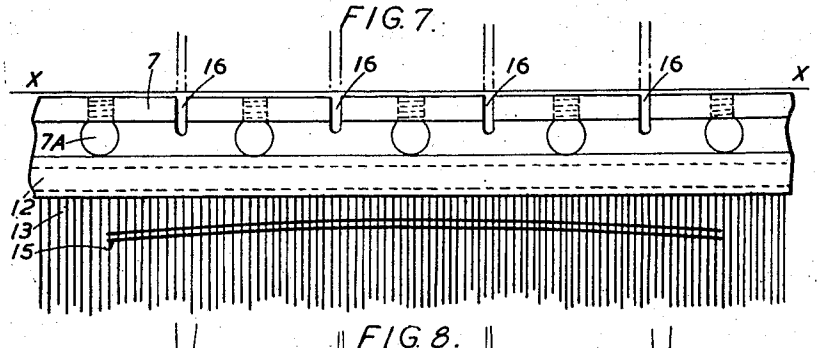


FIG. 8.

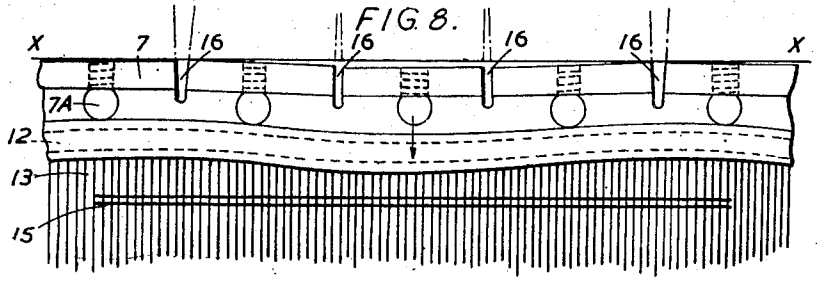
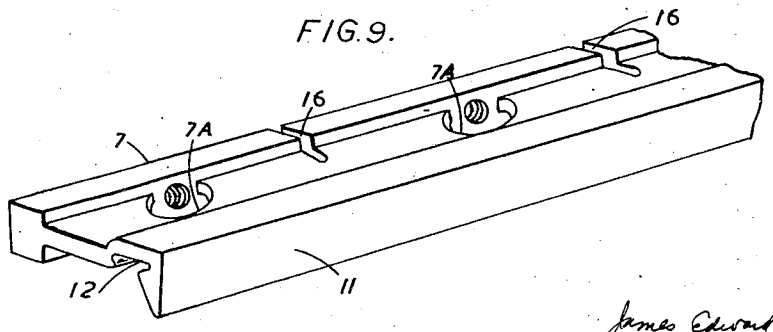


FIG. 9.



Inventor
James Edward Freeborn
By
Michael S. Pineles
Attorney

Patented Aug. 21, 1951

2,565,218

UNITED STATES PATENT OFFICE

2,565,218

ADJUSTABLE SCREEN FRAME FOR USE IN SILK SCREEN PRINTING

James Edward Freeborn, Broxbourne, England

Application January 28, 1948, Serial No. 4,878
In Great Britain January 13, 1948

12 Claims. (Cl. 101—415.1)

1

This invention relates to adjustable frames for holding the silk screen used in silk screen printing.

The known type of adjustable screen frame (known in the art as a "floating" frame) usually comprises an outer frame within which is mounted an inner frame comprising separately adjustable members disposed parallel to the corresponding members of the outer frame. The edges of the screen are secured, usually by tacking, to the adjustable members, which latter are adjusted for the purpose of tensioning or slackening the screen by means of screws or threaded bolts arranged around the outer frame and adapted to shift the said adjustable members relatively to the outer frame.

While such frames are satisfactory for initially tightening the screen and for taking-up subsequent overall slackening, they provide no satisfactory means of applying an adjustment to compensate for local silk distortion (i. e. tightening or slackening) caused by the weather, since the adjusting screws provided act to displace bodily the members of the inner frame and therefore can only effectively act to tighten or slacken the whole area of the screen.

Local silk distortion caused, for instance, by weather, is extremely inconvenient since it causes objects on the stencil carried by the screen to vary their position, so that the registering of different screens on any one print becomes a very difficult or impossible process.

Furthermore the known adjustable frames are usually made of wood which, if improperly seasoned tends to warp and distort the screen still more. Furthermore, attaching the screen by tacking is unsatisfactory since after a time the wood becomes so pitted that more tacks cannot be satisfactorily inserted.

It is an important object of this invention to provide an adjustable screen frame arrangement which makes possible correction of local distortion of the screen so that the consequent displacement of objects on the screen is prevented, or greatly reduced.

According to the invention, the screen holding frame members of such apparatus are arranged to be positively held in their adjusted positions against both inward and outward movement irrespective of the screen tension in such manner as to compensate for and be substantially unaffected by variations in the tension of the screen.

It is also among the objects of the invention to provide a screen frame having a simplified arrangement for attaching the screen to the frame in such manner as to reduce the strain on the screen material at the points of attachment.

2

The foregoing and other objects of the invention will be best understood from the following description of exemplifications thereof, reference being had to the accompanying drawings wherein

Fig. 1 is a perspective view, partly in section, showing a corner of one frame apparatus exemplifying the invention;

Fig. 2 is a perspective view of the same frame apparatus, as seen from the other side;

Figs. 3 and 4 are enlarged fragmentary perspective views showing the attachment of the screen to one of the adjustable screen holding members;

Fig. 5 is a fragmentary section of a corner of the frame apparatus taken approximately along the line V—V of Fig. 1 and having slightly different inner frame members;

Fig. 6 is a perspective view showing the separated ends of the outer frame members of Fig. 5; and

Figs. 7 and 8 are fragmentary plan views and Fig. 9 is a fragmentary perspective view of a modified form of a screen holding member of the invention, of an apparatus, such as shown in Figs. 1 to 6.

Referring to Figs. 1 to 6, there is shown a screen-printing frame apparatus having four side frame members 1 of a relatively fixed outer frame structure. The frame members 1, may be of material such as aluminum, and then mitred at the corners at which they are suitably secured to each other, as by bolts 2 and dowels inserted in holes 3.

Referring to Figs. 1 to 6, it will be seen that the outer frame comprises four side members 1 (preferably of aluminium) mitred at the corners where they are secured together by bolts 2 and dowels inserted in holes 3 (Figs. 5 and 6). The construction of Figs. 5 and 6 differs slightly from that of Figs. 1 and 2 inasmuch as in Figs. 5 and 6 the ends of the members 1 are recessed at 4 so that the bolts 2 do not project beyond the sides of the members 1 (see Fig. 5).

Each member 1 is formed with a recess 5, which, when the members 1 are assembled, extends entirely around the outer frame. Corner pieces 6 are inserted into the slots 5 at each corner, being secured in position by the dowels which pass through the holes 3.

The four screen-tensioning or holding members 7 may advantageously be made of brass or steel and are fitted as shown into the recesses 5, in

which they are slidably adjusted inwardly or outwardly by connector elements shown in form of screws 8 engaging tapped holes in the screen-holding members 7. The connector-elements or screws 8 are prevented from axial displacement in outward or inward direction by means of retaining members 9 the inner ends of which engage annular grooves 10 in the screws. The references 7A represent holes which accommodate the ends of the screws 8.

Each screen-holding member 7 is of the shape shown, and has an upstanding ledge 11 and a longitudinal recess or groove 12. The latter is adjacent to the point where the ledge 11 joins the main part of the member 7 so that the "necking" or thinning of the ledge 11 adjacent its junction facilitates flexing of the said ledge.

The screen 13, which is made of silk or other suitable material, is passed over the ledge 11 and is then pressed down into the groove 12 where it is secured by means of a series of substantially S-shaped spring clips 14. These latter are in their free position slightly wider than the groove 12 so that they require to be compressed to be inserted therein. Figs. 3 and 4 show how the clips 14 are fixed in position on top of the edges of the screen by inserting the left-hand side of the clip (as seen in Fig. 3) into the left-hand side of the groove 12 so as to trap the screen, and then exerting a downward thrust on the clip (see arrows in Fig. 3) so as to snap its other side into the groove. The two sides of the clip then exert outward pressure in the direction of the arrows in Fig. 4. When the material of the screen is so fastened around its edges, each screen-holding member is tightened by means of the screws 8 until the screen is suitably stretched.

As explained above, the tensioning screws 8 are restrained against axial movement, and they engage with their threaded ends threaded holes of the associated sections of the corresponding flexible screen-holding member 7. Accordingly, turning a tensioning screw 8 in one direction will subject its section of screen-holding member 7 to outward forces, and turning the screw 8 in the opposite direction will subject its screen-holding section to inward forces. This arrangement makes it possible to adjustably fix the position of each flexible section of such elongated screen-holding member 7, either more outwardly or more inwardly, relatively to the other sections of such holding member and thereby compensate for any distortion or change in the tension of one portion of the screen relatively to other portions of the screen held tensioned by such screen-holding member.

It will be clear that the ledge 11 eases direct pull of the silk on the clips 14.

The shape of the clips 14 permits the ends of adjacent clips to be overlapped, as shown in Fig. 2.

With a screen-printing frame apparatus of the invention, of the type described above, any irregular stretching or shrinking of the screen—which would cause distortion of the objects of the stencil appearing on the screen—can be, at least in part, overcome by appropriate adjustment of the individual adjusting screws 8 which make it possible to move each screen holding member 7, not only as a whole, but also to move individual sections or portions of each screen holding member 7 to a properly adjusted position and thereby compensate for any irregular stretching or shrinking of the screen.

Thus, referring to Figs. 7 and 8, a pair of lines

15 which should appear on the screen 13 as straight lines are shown in Fig. 7 is a distorted curved shape caused by uneven stretching or shrinking of the screen. With a screen frame of the invention, such distorted lines may be readily straightened by turning the individual adjusting screws 8 so as to flex the individual sections of the frame member to the position at which the lines 15 are straight (Fig. 8).

Figs. 7 to 9 also show the screen holding frame members 7 provided with transverse slots 16 for controlling the relative flexibility of the individual sections of each frame member which are individually connected by the adjusting screws to the outer frame structure. The degree of the flexibility between the individual longitudinal sections of each screen-holding frame member may be readily controlled by the depth of the slots.

The novel principles of the invention described above in connection with specific exemplifications thereof will suggest various other modifications and it is accordingly desired that the invention shall not be limited to any exemplifications shown or described therein.

I claim:

1. In a frame apparatus for screen printing: a fixed outer frame structure bordering on all sides an extended frame area; a plurality of inner elongated frame members each independently movable relatively to adjacent different elongated border portions of the outer frame structure, each inner frame member having clamping elements for affixing thereto peripheral portions of a printing screen to be stretched; said elongated frame members being formed with a plurality of longitudinally spaced individual frame portions which are flexible relatively to each other; a plurality of adjustably held connector elements extending from longitudinally spaced portions of said frame structure and engaging said longitudinally spaced individual frame portions of the individual frame member for fixing the operative positions of said frame portions and the tension of the different portions of the printing screen clamped thereto; said connector elements being individually adjustable for flexing said different individual frame portions of a frame member, both in inward and in outward direction, and independently and adjustably fixing their operative positions and the tension of different portions of the screen clamped thereto, and thereby compensate for any change in the tension under which different portions of said screen are held stretched by said frame portions.

2. In a frame apparatus for screen printing: a fixed outer frame structure bordering on all sides an extended frame area; a plurality of inner elongated frame members each independently movable relatively to adjacent different elongated border portions of the outer frame structure, each inner frame member having clamping elements for affixing thereto peripheral portions of a printing screen to be stretched, said elongated frame members being formed with a plurality of portions of reduced thickness subdividing their length into a plurality of longitudinally spaced individual frame sections which are flexible relatively to each other; a plurality of adjustably held connector elements extending from longitudinally spaced portions of said frame structure and engaging said longitudinally spaced individual frame sections of the individual frame members for fixing the operative positions of said

frame portions and the tension of the different portions of the printing screen clamped thereto; said connector elements being individually adjustable for flexing said different individual frame sections of a frame member, both in inward and in outward direction, and independently and adjustably fixing their operative positions and the tension of different portions of the screen clamped thereto; and thereby compensate for any change in the tension under which different portions of said screen are held stretched by said frame portions.

3. In a frame apparatus for screen printing: a fixed outer frame structure bordering on all sides an extended frame area; a plurality of inner elongated frame members each independently movable relatively to adjacent different elongated border portions of the outer frame structure, each inner frame member having clamping elements for affixing thereto peripheral portions of a printing screen to be stretched; said elongated frame members being formed with a plurality of longitudinally spaced individual frame portions which are flexible relatively to each other, said frame structure having inwardly facing recesses and said elongated frame members being adjustably guided in said recesses; and the plurality of connector screws having threaded engagement with spaced frame portions of said frame members for fixing their operative positions and the tension of the different portions of the screen clamped thereto; said screws being restrained against inward and outward movement relatively to said frame structure and being rotatable for adjustably flexing said different individual frame portions of a frame member both in inward and outward direction and independently and adjustably fixing the operative position of said individual frame portions and thereby compensate for any change in the tension under which different portions of said screen are held stretched by said frame portions.

4. In a frame apparatus for screen printing: a fixed outer frame structure bordering on all sides an extended frame area; a plurality of inner elongated frame members independently movable relatively to adjacent different elongated border portions of the outer frame structure, and each inner frame member having along the inner side thereof a projecting ledge and an undercut groove on the outer side of said ledge so that peripheral portions of the stretched screen passing over said ledge may be clamped in said groove; said elongated frame members being formed with a plurality of longitudinally spaced individual frame portions which are flexible relatively to each other; a plurality of adjustably held connector elements extending from longitudinally spaced portions of said frame structure and engaging said longitudinally spaced individual frame portions of the individual frame member for fixing the operative positions of said frame portions and the tension of the different portions of the printing screen clamped thereto; said connector elements being individually adjustable for flexing said different individual frame portions of a frame member, both in inward and in outward direction, and independently and adjustably fixing their operative positions and the tension of different portions of the screen clamped thereto, and thereby compensate for any change in the tension under which different portions of said screen are held stretched by said frame portions.

5. In a frame apparatus for screen printing as

claimed in claim 1, said connector elements comprising screws threadedly engaging said frame portions and rotatably mounted in said frame structure and restrained against both inward and outward axial movement relatively to said frame structure.

6. In a frame apparatus for screen printing as claimed in claim 5, each of said elongated frame members having a groove extending lengthwise thereof; said clamping elements comprising a plurality of spring clips shaped to be removably retained in resiliently clamped condition within said groove for clamping therein a peripheral portion of said screen.

7. In a frame apparatus for screen printing as claimed in claim 2, said connector elements comprising screws threadedly engaging said frame portions and rotatably mounted in said frame structure and restrained against both inward and outward axial movement relatively to said frame structure.

8. In a frame apparatus for screen printing as claimed in claim 7, each of said elongated frame members having a groove extending lengthwise thereof; said clamping elements comprising a plurality of spring clips shaped to be removably retained in resiliently clamped condition within said groove for clamping therein a peripheral portion of said screen.

9. In a frame apparatus for screen printing as claimed in claim 3, each of said elongated frame members having a groove extending lengthwise thereof; said clamping elements comprising a plurality of spring clips shaped to be removably retained in resiliently clamped condition within said groove for clamping therein a peripheral portion of said screen.

10. In a frame apparatus for screen printing as claimed in claim 1, each of said elongated frame members having a groove extending lengthwise thereof; said clamping elements comprising a plurality of spring clips shaped to be removably retained in resiliently clamped condition within said groove for clamping therein a peripheral portion of said screen.

11. In a frame apparatus for screen printing as claimed in claim 2, each of said elongated frame members having a groove extending lengthwise thereof; said clamping elements comprising a plurality of spring clips shaped to be removably retained in resiliently clamped condition within said groove for clamping therein a peripheral portion of said screen.

12. In a frame apparatus for a printing screen having a fixed outer frame structure bordering on all sides an extended frame area: a plurality of inner elongated frame members each independently movable relatively to adjacent different elongated border portions of the outer frame structure; each inner frame member having clamping elements for affixing thereto peripheral portions of a printing screen to be stretched, each of said elongated frame members being formed with a longitudinal ledge structure extending generally transversely to the frame area for engagement with the screen passing over a continuous ledge region thereof toward said clamping elements, and a plurality of lateral ledge connector sections extending outwardly at angles from a plurality of longitudinally spaced ledge sections of said ledge structure; said ledge connector sections being at least partially disconnected from each other so that ledge sections of the ledge structure of each frame member are flexible relatively to each other; a plurality of

connector elements engaging the ledge connector sections of each frame member and adjustably held in spaced portions of said outer frame structure and being adjustable thereon for flexing the different ledge sections of the associated frame members both in inward and outward direction for independently and adjustably fixing their operative positions and the tension of different portions of the screen clamped thereto and thereby compensating for any change in its tension.

JAMES EDWARD FREEBORN.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
867,345	Carter	Oct. 1, 1907
2,013,772	Ulrich	Sept. 10, 1935
2,261,305	Stephenson	Nov. 4, 1941

FOREIGN PATENTS

Number	Country	Date
14,397	Australia	July 12, 1928