

June 29, 1937.

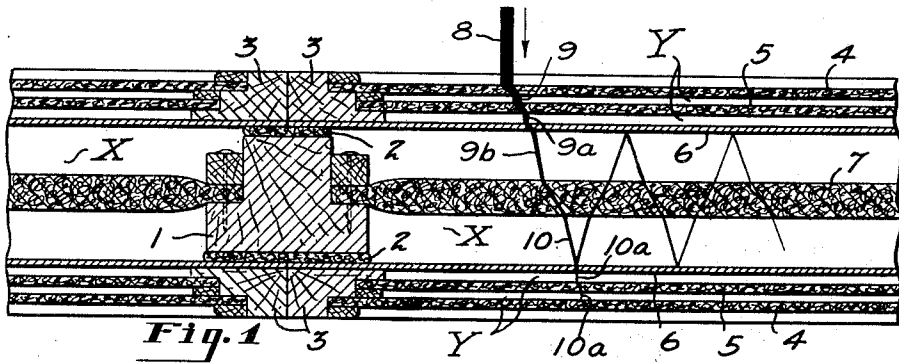
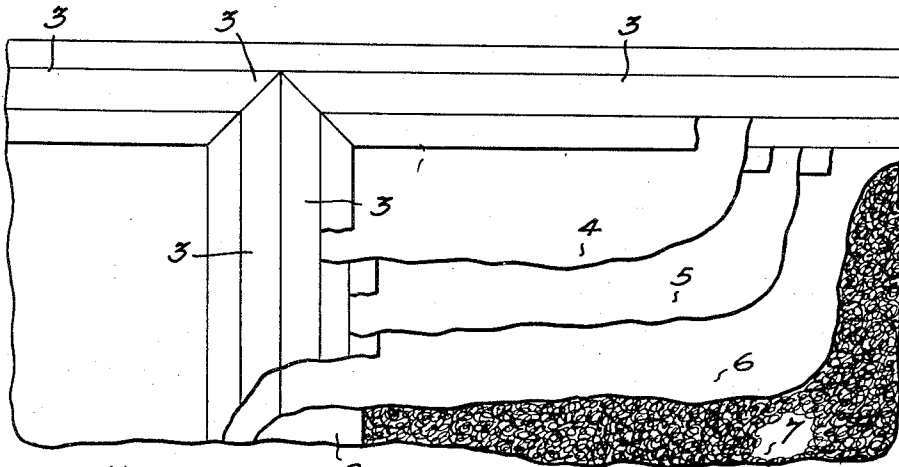
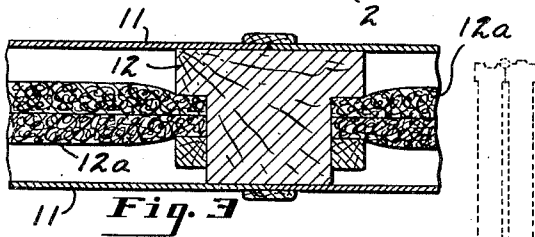
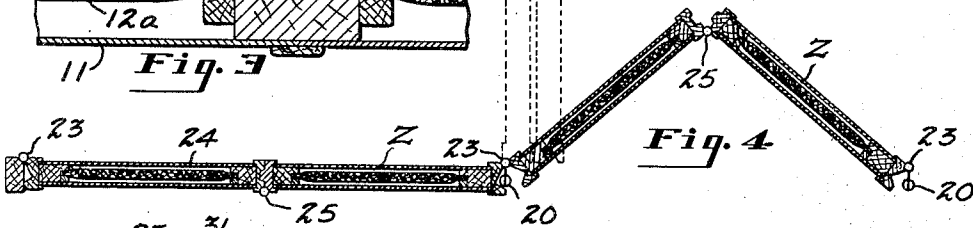
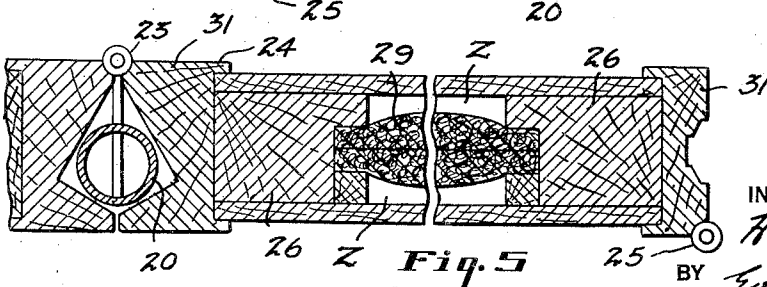
H. W. MAURER

2,085,436

SOUNDPROOF PARTITION

Filed Oct. 6, 1933

2 Sheets-Sheet 1



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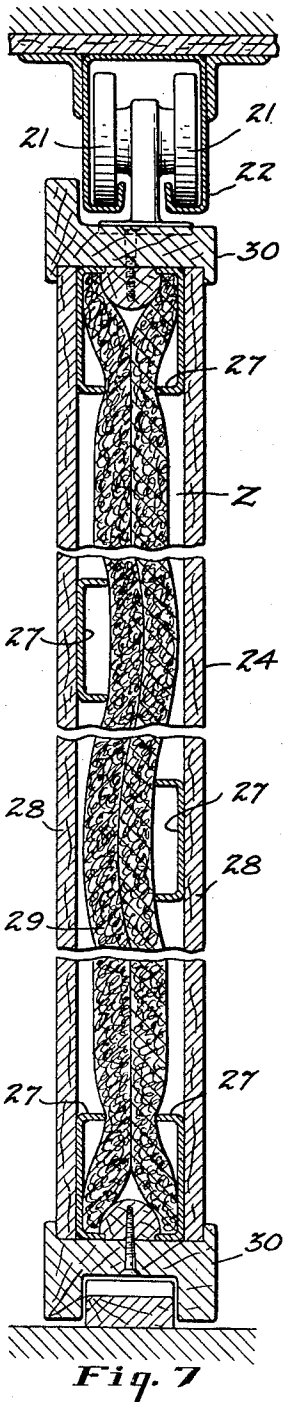
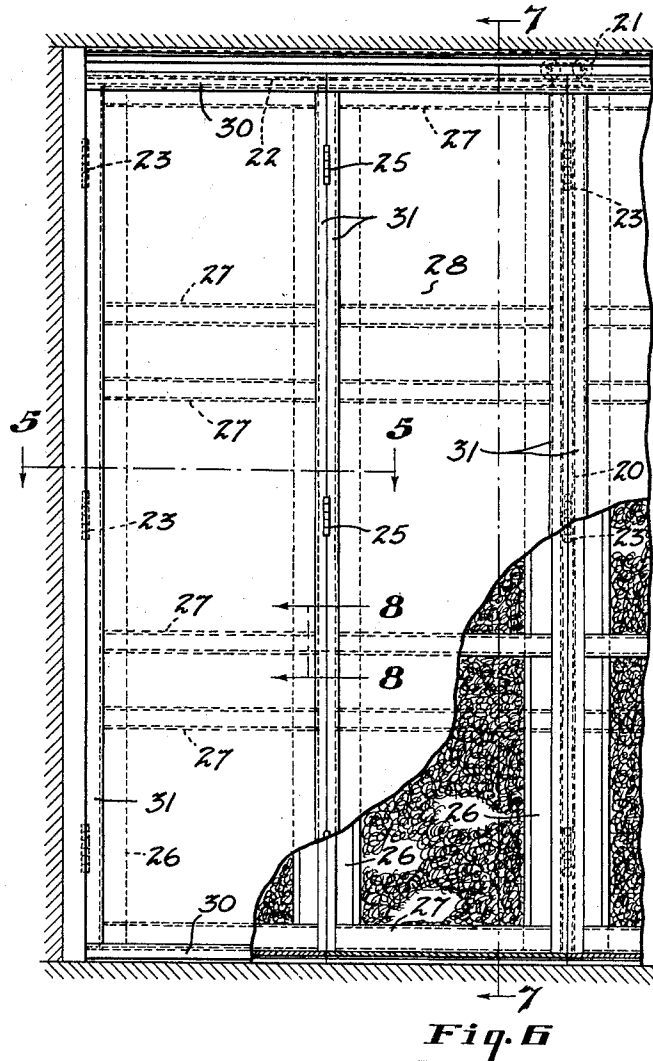
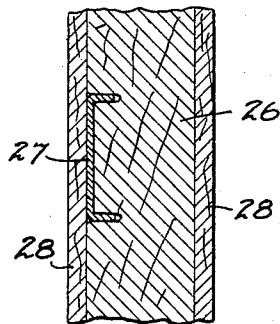
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H. W. MAURER
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2 Sheets-Sheet 2



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2,085,436

SOUNDPROOF PARTITION

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Application October 6, 1933, Serial No. 692,454

9 Claims. (Cl. 20—4)

This invention relates to sound absorbing walls and partitions and is a continuation in part of my co-pending application Serial No. 492,216 filed October 30, 1930.

5 One of the objects of the present invention is to provide a new and improved wall or partition which is efficient in preventing the passage of sounds therethrough and which is simple in construction and economical to manufacture.

10 Another object is to provide a partition of simple construction which is extremely efficient in absorbing sound created on one side thereof and preventing such sounds from being transmitted to the opposite side thereof.

15 Another object is to provide a wall or partition having a dead air space between its sides with means within the air space whereby the sound waves transmitted into such air space are absorbed and are reflected back and forth within such space until the energy thereof is substantially spent.

20 Another object is to provide a wall or partition having a dead air space between the sides thereof, each side including sound absorbing and deadening material whereby sounds created on the one side of the wall are absorbed and materially deadened to prevent their transmission to the opposite side of the wall.

25 Another object is to provide a wall or partition having spaced sides of sound absorbing material and reflecting surfaces on the inner faces of said sides and in which the sound waves that penetrate one side of the wall are caused to pass through a body of sound absorbent material disposed between the reflecting surfaces, and to be reflected from such reflecting surfaces back through the sound absorbing material for repeated absorption of residual sound.

30 A further object is to provide a sound proof wall or partition which may be collapsed when not in use.

35 With the above and other objects in view, which will be readily apparent from the following detailed description, the present invention consists in certain features of construction and combinations of parts which will be readily understood by those skilled in the art to which the invention appertains.

40 In the drawings, which illustrate suitable embodiments of the invention:

45 Figure 1 is a transverse section through a wall or partition in which the present invention is incorporated;

50 Fig. 2 is a fragmentary side elevation of the wall illustrated in Fig. 1;

Fig. 3 is a fragmentary transverse section of another type of partition in which the present invention is incorporated;

Fig. 4 is a transverse section through a partition of the collapsible type, in which the present invention is incorporated;

Fig. 5 is an enlarged section of the collapsible partition illustrated in Fig. 4;

Fig. 6 is a fragmentary side elevation of the collapsible partition illustrated in Fig. 4;

Fig. 7 is a vertical transverse section taken approximately on the line 7—7 of Fig. 6; and

Fig. 8 is a fragmentary section taken approximately on the line 8—8 of Fig. 6.

The present invention contemplates a wall or partition of the permanent or collapsible type and of such construction that sound created in the room on one side will be substantially inaudible in the room on the other side thereof.

The walls or partitions of the present invention, as will later be apparent, are particularly adaptable in partitions for use in collapsible partitions employed in hotels, churches, schools and the like wherein large rooms are frequently converted into smaller assembly rooms when the occasion arises.

Referring to the drawings, and particularly to Figs. 1 and 2, wherein a permanent type of wall is illustrated, such wall comprises a pair of spaced panel portions that are preferably spaced apart to provide a dead air space X therebetween for absorbing sounds. Such structure may be securely mounted upon vertical posts 1 extending from the floor to the ceiling of the room and the spaced side panels may be secured in any suitable manner to the posts 1, and if desired may be separated therefrom by means of suitable insulation material 2. Each side panel may be supported on a framework 3 comprising vertical and horizontal members secured to the spaced vertical posts 1 as previously described, and in the construction illustrated in Fig. 1 is preferably constructed of an outer panel 4 of suitable sound absorbing material such as loosely compressed wood fibres, an intermediate panel 5 of sound absorbing material such as felt, or other loosely assembled fibres, spaced inwardly from the outer panel 4, and an inner panel 6 spaced inwardly from the intermediate panel 5. The inner panel 6 is preferably of relatively thin dense material such as wood fibres compressed under considerable pressure and having a smooth, fine grained inner surface for reflecting sound waves into dead air space. As shown in Fig. 1 the inner panels 6 of the sides of the

walls face each other in spaced relation and it is preferred that the reflecting surfaces of the panels 6 may be highly polished to increase their efficiency. Furthermore, if desired, the panels 6 may be provided with a suitable reflecting facing. Intermediate the inner panels 6 and secured in any suitable manner through such means as the vertical posts 1, is a body of sound absorbent material 7 such as loose fibrous material, which extends uninterruptedly throughout the length and height of the panels. If desired, however, this body of sound absorbent material may be omitted.

It will be noted in Fig. 1 that this body 7 of sound absorbent material is within the air space X and is spaced from the inner panels 6.

It will be observed from the solid diagram shown in connection with the wall illustrated in Fig. 1, that the sound created adjacent the upper side of the wall is absorbed and the energy thereof greatly diminished by the peculiar construction of the sides of the wall. The explanation of this absorption and expending of energy of the down waves can best be explained by referring to the solid diagram of a single sound wave illustrated in Fig. 1.

The sound wave represented by the relatively heavy solid line 8 penetrates the outer panel 4 wherein a portion of the wave is absorbed by the panel 4. The unabsorbed portion of the sound wave represented by the somewhat narrower line 9 then penetrates the intermediate panel 5 and in passing through this panel a further portion of the sound wave is absorbed by the loosely assembled fibers thereof. The absorption of sound up to this point not only reduces transmission through the wall but reduces reverberation in the room which the partition divides. The unabsorbed portion represented by the line 9a of the sound wave which has passed through the intermediate panel 5 then passes through the relatively thin inner panel 6 into the dead air space X as represented by the line 9b and passes through the thick body of sound absorbent material 7 and becomes greatly diminished as indicated by the line 10. After passing through the central portion of sound absorbent material 7 the greatly diminished sound wave then strikes the smooth polished surface of the opposite reflecting panel 6, and by reason of such surface is caused to substantially rebound and again pass through the body 7 of sound absorbent material and strikes the corresponding surface of the first reflecting panel 6 where it is again reflected toward the lower reflecting panel. It is thus reflected back and forth between the smooth surfaces of the panel 6 and upon each reflection passes through the body of sound absorbent material 7 and by reason of the absorption of the sound by the dead air in the space X and the body of sound absorbent material 7, and the energy of the sound wave becomes totally or practically spent and the sound is practically inaudible on the side of the wall opposite the source of sound.

The greater portion of the sound wave that has passed into the air space X is reflected between the panels 6, but however, at each contact thereof may penetrate the panel 6, as represented by the very light lines 10a, which small portions of the sound wave, however, are not of sufficient strength to penetrate to the other panel 4 of the lower side of the wall as indi-

cated in Fig. 1, with the apparent result that the sound created adjacent the one side of the wall is substantially inaudible at the other side of the wall.

It is to be noted that an air space Y is provided between each outer panel 4 and intermediate panel 5 and between each intermediate panel 5 and inner panel 6. These air spaces between the three panels function somewhat to absorb the sound waves passing therethrough. They thus prevent reflection back into the room and reduce reverberation in the room which the partition divides. The several panels, however, are very efficient in preventing the transmission of sound through the wall even should they be arranged with spaced engagement.

The sound is thus absorbed by the different panels of each side of the wall and the energy of the waves is practically spent as the waves are reflected several times between the smooth surfaces of the reflecting panel 6 and through the interposed body 7 of sound absorbent material. It is apparent that under various conditions it may be desirable to increase or decrease the number of sound absorbing panels in each side of the wall or partition, and, furthermore, it may be desirable to change the particular relationship of the panels.

In Fig. 3 I have illustrated one modification in which a partition may comprise merely a pair of spaced panels 11 of suitable material such as pressed ply wood, or asbestos board supported on suitable vertical posts 12 and between which panels 11 a body of sound absorbent material 12a is interposed. In this case, however, it is preferred to form the inner surfaces of the two panels 11 of very dense material or with a polished finish or to provide the same with a polished sound reflecting facing for reflecting the sound waves after they have once entered the air space between these panels.

A sound-proof or sound absorbing wall is very desirable in hotels, churches, schools and the like and as previously mentioned, the wall of the present invention is particularly adaptable for use in a collapsible partition employed to divide a large room into smaller rooms, such as assembly rooms.

As an illustration of one type of collapsible partitions, one particular adaptation is shown in Figs. 4 to 8, inclusive.

In this adaptation the partition is composed of a number of individually collapsible sections Z. Two such sections are illustrated in Fig. 4, one section being shown completely extended and the other section partially collapsed. Each section comprises vertical columns 20 suspended by means of rollers 21 from a suitable track 22 secured to the ceiling of the room containing the partition. Each vertical column 20 is provided at one side with a suitable number of hinge plates 23 which are common to a pair of doors 24. Each door 24 may be constructed similar to the construction illustrated in Fig. 3 or in Fig. 1, if desired, and is hingedly connected by means of hinges 25 to the next adjacent door, the hinges being arranged to pivot in a direction opposite to the hinges which secure the doors 24 to the vertical posts 20.

The columns 20 are movable toward each other, so that when the continuity of the doors is broken the columns 20 may be moved substantially into parallel relationship with each other as shown in dotted outline, and thus cause the

doors 24 to assume a collapsed position as indicated in Fig. 4.

Each section Z is individually collapsible in this manner and it can be seen that any number of sections may be utilized to thus form a complete partition. In the form illustrated in Figs. 4 to 8, each door preferably comprises a pair of vertical stiles 26 which may be suitably connected by means of channel members 27. In this construction the vertical stiles 25 are slotted at spaced points so that the flanges of the horizontal channel members may be positioned within these slots and the web of the channels secured directly to the stiles as indicated in Fig. 8, thus providing an extremely rigid construction. Two such channels may be provided at the top and lower portion of the door and other channels may be alternately arranged at opposite sides of the stiles in order to provide a rigid construction. By so spacing the channels, sound conducting through rails is eliminated and this also permits the sound absorbing material to be disposed in uninterrupted continuity from the very top to the very bottom of the panel construction. Because of the very narrow stiles and the particular arrangement of the parts, a minimum of through sound conducting framework parts thus obtains and the uninterrupted hollow construction also materially adds to the decreasing of sound transmission. Mounted upon the sides of the vertical stiles 26 are the spaced panels 28 which may be of any suitable material such as pressed wood, asbestos board, plywood, or the like, and interposed between these spaced panels is a body of sound absorbent material 29 such as felt or sound absorbing wool or other suitable material. It will be noted in Fig. 7 that this body of material may be formed of two pieces and disposed between the horizontal frame channels 27. The inner surfaces of the side panels 28 are preferably polished or else are faced with some suitable material having a dense or polished surface for reflecting the sound waves within the space between the panels 28. Each door also includes upper and lower members 30 secured to the vertical stiles 26 and having a channel face so that the panels of the door may be closely confined therebetween. Each door also includes vertical members 31 secured to the stiles and also having channel faces for closely confining the panels of the door 24. One of the latter members is recessed so as to receive the vertical posts 20 when the panels are extended as shown in Figs. 4 and 5, and the other vertical member may be recessed to receive a correspondingly shaped portion of the adjacent member of the next adjacent door as indicated in Figs. 4 and 5.

The partition of the present invention is easily adaptable for use as a permanent wall or a collapsible partition and is very efficient in preventing the transmission of sound between the rooms separated thereby.

Although several types of material have been specified for the sound absorbing and reflecting panels, it is to be understood that other types of material may be employed equally as well, and advantageous results obtained.

Although several embodiments of the invention have been herein shown and described it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined in the following claims.

What I claim is:

1. In a foldable partition, a plurality of hinged-

ly connected sections, each of said sections comprising an open framework, a body of sound absorbent material extending across the opening of said framework, and a pair of side elements, one of said elements being secured to one side of said framework in spaced relation to said absorbent material and the other of said side elements being secured to the opposite side of said framework in spaced relation to said absorbent material, said side elements having polished reflecting surfaces facing said absorbent material.

2. In a foldable partition, a plurality of hinged-ly connected sections, each of said sections comprising spaced vertical stiles, horizontal connecting members extending between said stiles, a body of sound absorbent material extending between said stiles and uninterruptedly between said horizontal members and side panels disposed at opposite sides of said section, said panels having polished sound reflecting surfaces and being in engagement with said stiles and being spaced from said sound absorbent material.

3. In a foldable partition, a plurality of hinged-ly connected sections, each of said sections comprising a pair of spaced vertical stiles, channel members extending between said stiles at the tops and bottoms thereof and at opposite sides thereof, said stiles having flange receiving slots and the flanges of said channel members being disposed in said slots, a body of sound absorbent material extending between said stiles and side panels secured to said section at opposite sides thereof in spaced relation to said sound absorbent material.

4. In a foldable partition, a plurality of hinged-ly connected sections, each of said sections comprising a pair of spaced vertical stiles, channel members extending between said stiles at the tops and bottoms thereof and at opposite sides thereof, said stiles having flange receiving slots and the flanges of said channel members being disposed in said slots, a body of sound absorbent material extending between said stiles and side panels secured to said section at opposite sides thereof in spaced relation to said sound absorbent material, said sound absorbent material being secured along its vertical edges to said stiles and being confined at its top and bottom edges between the flanges of said channels.

5. In a foldable partition, a plurality of hinged-ly connected sections, each of said sections comprising a pair of spaced vertical stiles, channel members extending between said stiles at the tops and bottoms thereof and at opposite sides thereof, said stiles having flange receiving slots and the flanges of said channel members being disposed in said slots, a body of sound absorbent material extending between said stiles and side panels secured to said section at opposite sides thereof in spaced relation to said sound absorbent material, said side panels having polished sound reflecting surfaces facing said sound absorbent material.

6. In a foldable partition, a plurality of hinged-ly connected sections, each of said sections comprising a pair of spaced vertical stiles, channel members extending between said stiles at the tops and bottoms thereof and at opposite sides thereof, said stiles having flange receiving slots and the flanges of said channel members being disposed in said slots, a body of sound absorbent material extending between said stiles and side panels secured to said section at opposite sides thereof in spaced relation to said

sound absorbent material, said sound absorbent material being secured along its vertical edges to said stiles and being confined at its top and bottom edges between the flanges of said channels, said side panels having polished sound reflecting surfaces facing said sound absorbent material.

7. A wall comprising a pair of opposed side members having an air space therebetween, each side member having a panel at its inner side provided with a polished surface facing the corresponding panel of the other side member, and at least one sound absorbing panel of loosely compressed material disposed in spaced relation therewith, whereby sound waves penetrating one side member may be partially absorbed by said absorbing panel and whereby the unabsorbed waves may be transmitted through said inner panel to said air space and reflected between the polished surfaces of said inner panels.

8. In a wall structure, spaced vertical members, a body of sound absorbent material extending between said members and side members secured to said vertical members, said side members including a panel at one side of said absorb-

ent material said panels having polished reflecting surfaces facing said absorbent material, and a panel disposed at the other side of said absorbent material, and spaced therefrom whereby sound waves penetrating said side members and entering the space therebetween will pass through said sound absorbent material and be reflected by the surfaces of said panels.

9. In a wall structure, spaced vertical members, a body of sound absorbent material extending between said members and side members secured to said vertical members, said side members including a panel disposed at one side of said absorbent material, and a panel disposed at the other side of said absorbent material said panels having polished reflecting surfaces facing said absorbent material, and spaced therefrom whereby sound waves penetrating said side members and entering the space therebetween will pass through said sound absorbent material and be reflected by the surfaces of said panels, said side members also including a plurality of spaced panels having air spaces therebetween.

HERMAN W. MAURER.

CERTIFICATE OF CORRECTION.

Patent No. 2,085,436.

June 29, 1937

HERMAN W. MAURER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, first column, line 25, claim 8, after the word "panel" insert disposed; and second column, lines 1 and 2, same claim 8, strike out the words "said panels having polished reflecting surfaces facing said absorbent material" and insert the same after "material" and before the comma in line 4, same claim; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of August, A. D. 1937.

(Seal)

Leslie Frazer
Acting Commissioner of Patents.