Sept. 9, 1941. S. ROSENZWEIG 2,255,571

MEANS FOR ISOLATING MACHINERY

Filed Nov. 16, 1939 2 Sheets-Sheet 1

Fig. 1.

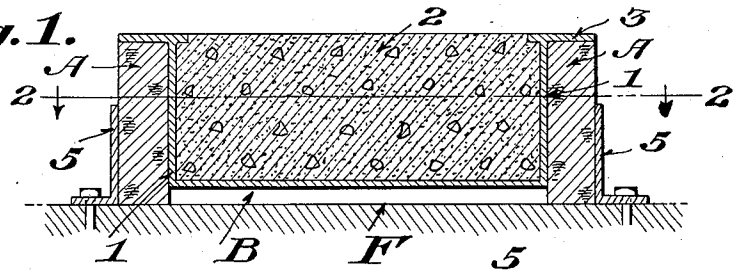


Fig. 2.

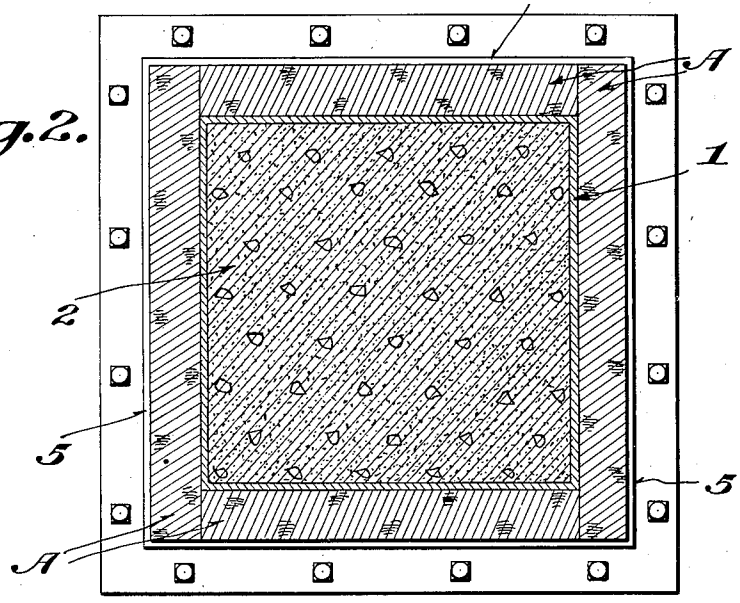


Fig. 3.

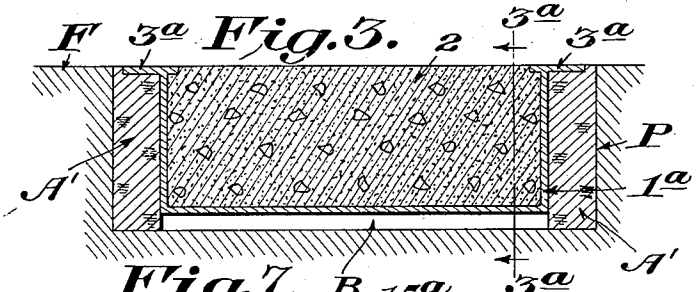


Fig. 3a

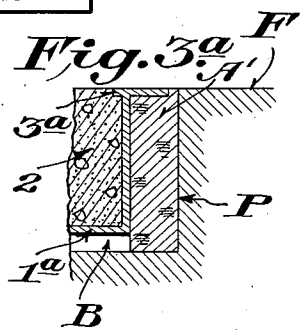
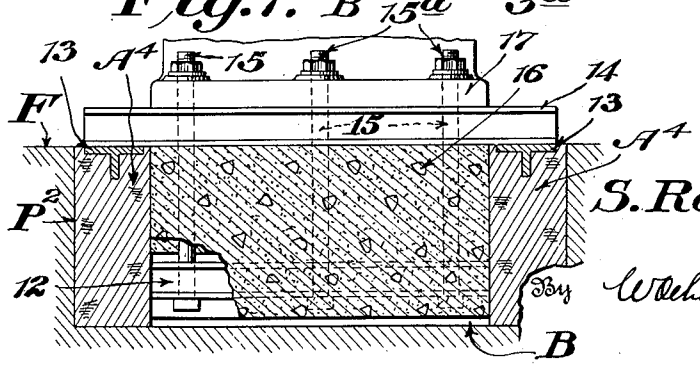


Fig. 7.



Inventor

S. Rosenzweig,

By Wallace & Groff.

Attorneys

Sept. 9, 1941. S. ROSENZWEIG 2,255,571

MEANS FOR ISOLATING MACHINERY

Filed Nov. 16, 1939 2 Sheets-Sheet 2

Fig. 4.

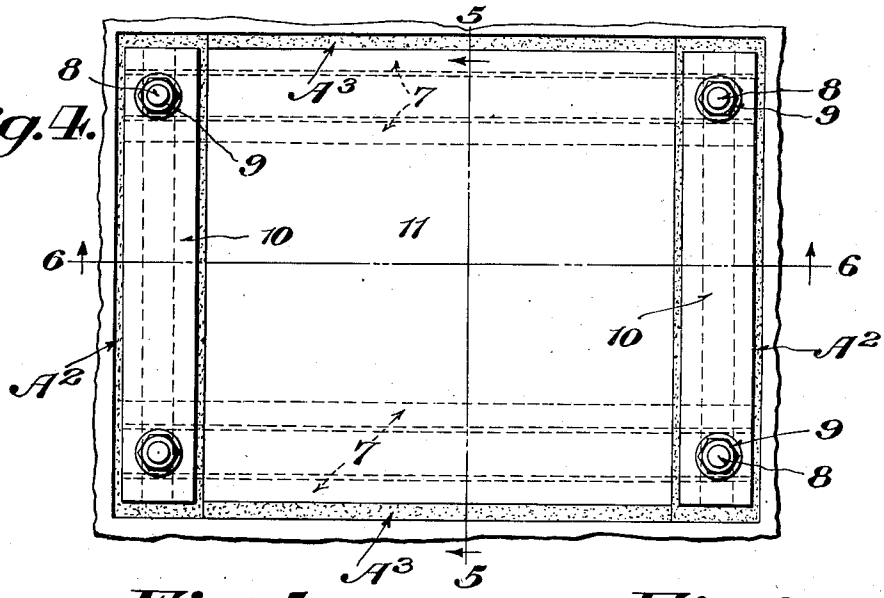


Fig. 5.

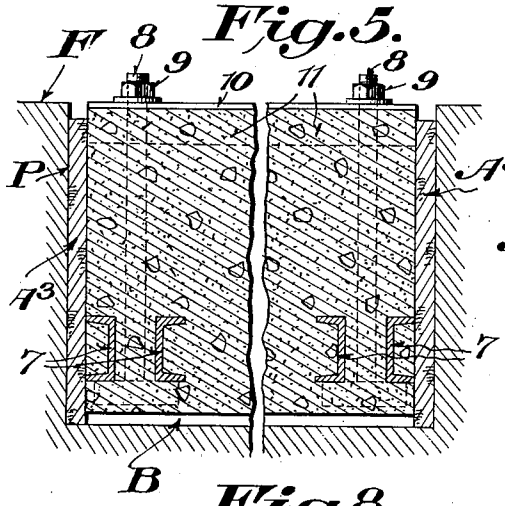


Fig. 6.

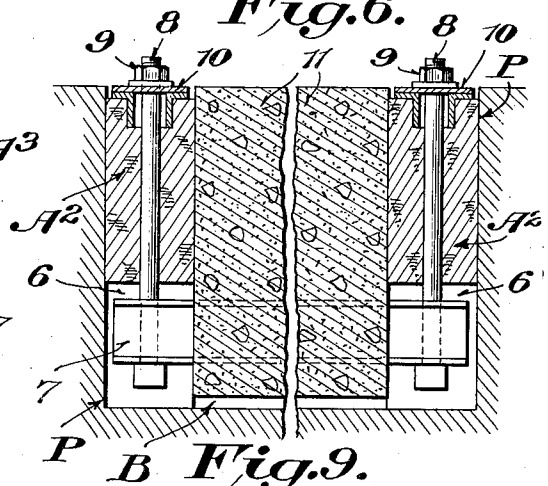


Fig. 8.

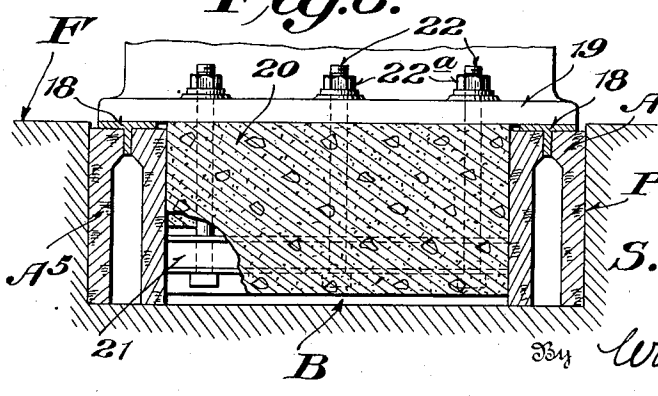
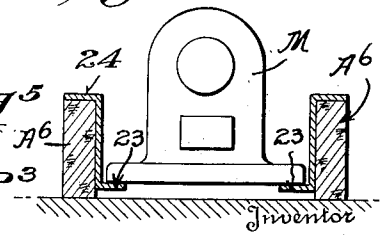


Fig. 9.



Inventor

S. Rosenzweig,

By Wheelwright & Groff

Attorneys

Patented Sept. 9, 1941

2,255,571

UNITED STATES PATENT OFFICE

2,255,571

MEANS FOR ISOLATING MACHINERY

Siegfried Rosenzweig, Long Island City, N. Y.

Application November 16, 1939, Serial No. 304,863

2 Claims. (Cl. 248—22)

This invention relates to means for isolating operating machinery from a floor or sub-base, and has primarily in view the utilization of organic materials of any kind, such, for example, as cork, in a novel way, to obtain an isolating efficiency equal to that obtainable with steel springs but at considerably less cost.

While cork has heretofore been employed as an isolating medium, nevertheless it has been the general practice to use it in sheets or blocks disposed horizontally beneath the machine to be isolated, that is, to use the broad surfaces of a unit or units of relatively shallow depth as the load sustaining surfaces between the base of the machine and the sub-base or floor. In some cases, it has also been heretofore proposed to use cork disposed vertically at the sides, but in this situation, the cork, unlike cork at the bottom, sustains no load. In installations where cork is used between the bottom of the machine and the sub-base, it carries the entire load and therefore it often becomes compressed to such an extent after a comparatively short period of use, that it loses its isolating efficiency. While in a measure this may be overcome by correctly calculating the thickness of the cork sheet relative to the load and using metal plates, nevertheless such calculations show that it would be necessary to provide a body of cork of such depth and large area that it would be cumbersome and impractical as compared with the cost of metal springs. In other words, cork of sufficient area and thickness to be useful for maximum isolation efficiency would be excessively expensive.

According to the present invention, it is proposed to support or suspend the machinery foundation upon vertically arranged spaced sections or blocks of cork located beneath the ends or sides of the machine, omitting cork isolation at the bottom entirely. In other words, it is proposed to suspend the machine base or its concrete foundation as the case may be from the top sides of cork blocks so that the lowest point of the base or foundation is located below the upper or top sides of the cork blocks and held spaced above the sub-base. The said blocks are of sufficient depth to obtain the correct amount of deflection to obtain isolating efficiency and of the proper width to obtain permissible and optimum unit loading. Thus, the present invention distinguishes from the practices heretofore outlined by loading the upper surfaces of cork blocks located beneath opposite sides or ends or both of the machine base, while omitting cork between the bottom face of the foundation (or base) and the sub-base, so that the vertical depth of the cork assumes the entire load. For example, if in a given illustration, providing isolation only on two sides would require blocks twenty inches wide, the same result would be obtained by providing blocks only ten inches wide on all four sides. Ordinary cork one inch thick will compress about one-sixteenth of an inch when loaded correctly. Thus, since large foundations are rarely less than 2'6'' to 3' in depth, it is possible according to the present invention to obtain a deflection in the cork of 2'', and more without resorting to a cumbersome construction, and at the same time, obtain a high efficiency isolation. In addition to properly loading the cork and obtaining correct isolation, the vertically loaded cork blocks also provide side isolation in a single structure. That is to say, by omitting cork at the bottom of the installation and using it only at the sides, the latter not only serves to prevent the transmission of vertical vibrations to the sub-base or floor, but also prevents the transmission of horizontal vibrations resulting from torque incident to the operation of rotating machines at varying speeds.

A further object of the invention is to provide a novel arrangement of cork supports which will provide a much simpler and cheaper construction of foundation than is obtainable with springs, and which reduces the elevation of the machine above the floor or sub-base. For example, if a given installation required cork twenty inches thick to be placed between the bottom of the machine base or foundation and the sub-base, it is obvious that the machine would be raised considerably above the sub-base. However, with the present invention, cork blocks of the proper top area could be placed about the sides of the machine and the latter suspended therefrom so that the actual elevation of the machine would only be the depth of the air space between the machine base or foundation and the sub-base.

With the above and other objects in view which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts, hereinafter more fully described, illustrated and claimed.

A preferred and practical embodiment of the invention is shown in the accompanying drawings, in which:

Figure 1 is a vertical cross sectional view showing a simple embodiment of the invention.

Figure 2 is a horizontal cross sectional view taken on the line 2—2 of Fig. 1.

Figure 3 is a vertical cross sectional view illustrating the construction of Fig. 1 embodied in a pit.

Figure 3ª is a detail vertical sectional view taken on the line 3ª—3ª of Fig. 3.

Figure 4 is a top plan view of a modified form of construction.

Figure 5 is a contracted vertical cross section taken on the line 5—5 of Fig. 4.

Figure 6 is a contracted vertical section taken on the line 6—6 of Fig. 4.

Figure 7 is a vertical sectional view of a modification wherein the structural members of a poured foundation do not project into the cork blocks and the machine base is supported on structural members whose ends rest on the upper surfaces of the cork blocks.

Figure 8 is a vertical sectional view illustrating another embodiment of the invention similar to that shown in Fig. 7, but omitting the structural elements between the machine and the poured foundation, the base of the machine being supported directly on the tops of the cork blocks.

Figure 9 is a diagrammatic view illustrating a further embodiment of the invention.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

A distinctive feature of the invention resides in providing a receptacle which may be above the floor line or sub-base, or, on the other hand, may be below it in the form of a pit, said receptacle having cork load sustaining blocks at two or more sides thereof for suspending a foundation and the machine mounted thereon.

Referring to Figs. 1 and 2 of the drawings, it will be observed that a suitable container or pan 1 may be employed into which the concrete foundation 2 for the machine may be poured. This foundation supporting pan may be made of sheet metal of any required gauge and is provided at its upper edge with an outwardly directed bearing flange 3. Cork blocks A are arranged about all four sides of the pan 1 and beneath the flanges 3 so as to be in supporting engagement therewith. It will, of course, be understood that the vertical depth of the cork blocks A when compressed is greater than the vertical depth of the foundation including the pan so as to provide an air space B between the bottom of the pan and the sub-base or floor F. The outer sides of the cork blocks A are engaged by the upstanding side wall elements 5 which constitute the receptacle or enclosure for the cork and foundation. These elements may be secured to the floor or sub-base in any conventional manner, and together with the side walls of the pan 1, provide means for confining the cork blocks A so as to prevent lateral deflection under load.

With the arrangement shown in Figs. 1 and 2, it will be apparent that the bottom of the pan 1 which provides a transverse support for the foundation is elevated only a short distance above the upper surface of the sub-base F, this distance being entirely independent of the depth of the isolating material. In many cases, a space of ⅛ of an inch may be all that is required. By placing the cork blocks A on all four sides of the receptacle the pan 1 and the machinery foundation are completely cradled within cork walls, thereby making it possible to obtain a deep section of isolating material, or, in other words, a great length of spring without raising or elevating the machine unduly from the sub-base. The space B between the bottom of the pan and the surface of the floor F contains trapped air which is one of the best isolating mediums available, and under certain conditions, it may even be desirable to seal the space between the pan and the cork walls so that compressed air may be injected into the space B and then sealed in.

In the arrangement shown, it will be apparent that the full load of the pan and foundation including the machine, will rest directly upon the upper sides of the cork blocks A. In other words, the cork blocks are subjected to a straight compression load.

Figure 3 of the drawings illustrates how the construction shown in Figs. 1 and 2 may be carried out where it is desired to place the machinery foundation, including the pan, in a receptacle in the form of a pit. In this event, the side walls of the pit P are lined with the cork blocks A′ of the same type, for example, as the blocks A shown in Fig. 1. The pan 1 has the top flanges 3ª which rest on the upper surfaces of the cork blocks A′. The flanges 3ª, however, are not co-extensive in width with the top sides of the cork blocks but terminate inwardly thereof so that none of the metal pan will engage with or directly contact the sides of the pit, thereby avoiding the transmission of any vibration to the sub-base or floor.

In Figs. 4, 5 and 6, there is shown a further modification of the invention wherein the foundation is poured directly in a receptacle or pit lined with cork, said foundation being lifted after the concrete has set by suspending bolts anchored in plates, or their equivalent on top of the cork. In this instance, the cork blocks which sustain the load are only located at two opposite sides or ends of the pit while the area between the other sides of the pit and the foundation are lined with relatively thick sheets of cork which do not sustain or carry load, merely acting as side isolation elements to prevent the transmission of vibrations manifesting themselves at an angle to a vertical plane.

Referring more specifically to Figs. 4, 5 and 6, it may be pointed out that the receptacle or pit P′ formed in the sub-base F′ is provided at opposite ends thereof with the cork load sustaining blocks A^2, while the opposite side wall portions are lined with the relatively thin non-load carrying sheets of cork A^3. The cork load sustaining blocks A^2 are provided at their lower portions with suitable recesses or openings 6 for receiving the transverse foundation supporting and reinforcing members 7 suspended by bolts 8 fitted in vertical openings in the cork blocks. The heads of the bolts 8 engage beneath the reinforcing member 7 while the upper threaded ends thereof which receive the nuts 9, are adapted to be supported on or by suitable bearing elements 10 which preferably run the full length of the top sides of the cork blocks A^2. Any suitable structural shapes, such as angle irons, T-irons, or the like, may be used as bearing members. In the example shown, angle irons with a covering shim plate may provide the load sustaining means for the top of the block.

After the pit is provided with the cork load sustaining blocks A^2 and the liners A^3, conventional means may be used for preventing flowable concrete from entering the recesses 6 where the ends of the structural member 7 enter the blocks of cork. The concrete foundation 11 may then be poured within surrounding cork shell, and,

after it has set, the nuts 9 may be manipulated to lift the entire foundation from the bottom of the pit and transfer the load thereof to the upper sides of the cork blocks thereby compressing the same and providing a dead air space between the foundation and the floor of the pit. When the foundation 11 has been elevated sufficiently from the bottom of the pit, having due consideration for the weight of the machine to be supported on the foundation, the device is ready for operation.

A further modification of the invention is shown in Fig. 7, from which it will be observed that the ends of the structural members 12 embedded in the concrete foundation do not project into the cork load sustaining blocks. According to this embodiment, the sub-base F is provided with a receptacle or pit P^2. In practice the structural reinforcing members 12 for the foundation are first laid in the bottom of the pit. The cork load sustaining blocks A^4 are then placed between the ends of the structural members 12 and the ends of the pit, and if desired the side walls of the pit may be lined with the relatively thin non-load sustaining cork sheets, according to the embodiment shown in Fig. 4. The top sides of the cork load sustaining blocks A^4 may be provided with suitable bearing shims or load distributing members 13 for supporting the ends of the horizontally arranged beams or equivalent members 14. When the transverse reinforcing elements 12 are laid on the bottom of the pit they are fitted with the suspending bolts 15 whose upper ends are intended to project above the beams 14 to receive the base of the machine. However, before the machine is placed in position on the beams, the concrete foundation 16 is poured within the cork walls and about the structural reinforcing elements 12, the bottom of the foundation being formed directly on the bottom of the pit. After the concrete foundation has hardened, the machine base 17 may be positioned on the beams 14 and over the upper threaded ends of the suspending bolts 15. The nuts 15^a on the suspending bolts may then be manipulated so as to elevate the foundation 16 so that the bottom thereof becomes spaced from the bottom of the pit. Thus, the entire load of the foundation and the superimposed machine is transferred to the top sides of the blocks A^4, which may be solid throughout their length and depth, in the sense that they are not pierced in any way by the structural elements in the foundation.

A further modification of the invention is shown in Fig. 8 which functions similarly to the construction shown in Fig. 7, the difference, however, being that the beams 14 of Fig. 7 are omitted and the machinery base itself becomes the means for transmitting the load of the foundation and the machine directly to the upper sides of the cork load sustaining blocks. Referring specifically to Fig. 8, it will be observed that the sub-base F is provided with a receptacle or pit P^3 provided at its ends with the cork blocks A^5 having at their top sides the bearing elements 18. The machine base 19 is substantially co-extensive in length with the pit so that the ends of the machine base rest directly on said members 18. The concrete foundation 20 is poured in and about the transverse foundation supports 21 which are carried by the suspension bolts 22. When the concrete foundation 20 has set and the machinery base is placed in position, the nuts 22^a of the bolts 22 may be manipulated to raise the foundation from the bottom of the pit and transfer the entire weight of the foundation and machine to the top sides of the cork load sustaining members A_5. As shown, the isolating medium may be cut away at the center if the entire width is not required from the standpoint of loading.

Figure 9 of the drawings illustrates a further modification of the invention embodying the same features and principles described in connection with the remaining figures of the drawings. In this figure, the hanger type machine supports perform the same function as the pan or container previously referred to. That is to say, the machine support includes members having a bottom portion 23 connected to an upwardly extending side member terminating in the outwardly projecting arm 24 which bears on the top sides of the cork blocks A^6. The machine M has its base resting on the bottoms 23 of the machine supports, and in this construction, as in the other embodiments, the lowermost point of the machine support is spaced above the sub-base or floor while the lowest point of the machine itself is located or disposed substantially below the top load sustaining sides of the cork blocks A^6.

From the foregoing, it will be apparent that in all forms of the invention, it is proposed to utilize cork load sustaining blocks so spaced and arranged as to carry the entire weight of a foundation and/or the machine itself on the top sides thereof. In all forms a receiving space is provided for the machine or its foundation or cork isolating means. Also, in every instance, the foundation or base of the machine is elevated or spaced from the bottom of the pit. This air chamber between the bottom of the foundation and the bottom of the pit, may be made by utilizing means which initially provides, and subsequently maintains, the proper spacing between the bottom of the foundation and the bottom of the pit or other sub-base surface, or, on the other hand, the foundation may be poured directly on the bottom of the pit or other sub-base surface and be subsequently lifted simultaneously with the loading or compressing of the cork blocks.

I claim:

1. A vibration isolating structure for operating machinery, comprising, in combination, a sub-base including a horizontal surface, retaining walls perpendicular to said surface, isolation means in the form of slabs of resilient non-metallic material of rectangular cross-section, said slabs having their lower ends resting on the said surface of the sub-base and their outer faces engaging said retaining walls and arranged to form an enclosure which provides an inner lining for the retaining walls, a machinery support fitting into the enclosure formed by said slabs and having continuous bottom and side walls, said side walls of the support engaging the inner faces of the said slabs to confine the same relative to the retaining walls and cause such slabs to absorb horizontal vibrations resulting from torque incident to the operation of machines rotating at high speeds, means carried by said support and resting on the upper ends of the said slabs to impart vertical vibrations thereto and cause the slabs to absorb and prevent transmission of vertical vibrations to the sub-base, and said means also mounting the support to suspend the bottom wall of the support above the horizontal surface of the sub-base to provide

a trapped air pocket between the support and the base.

2. A vibration isolating structure for operating machinery, comprising, in combination, a sub-base including a horizontal surface, retaining walls perpendicular to said surface, isolation means in the form of rectangular slabs of cork, said slabs having their lower ends resting on the horizontal surface of the sub-base and their outer faces engaging said retaining walls and arranged to form an enclosure which provides an inner lining for the retaining walls; a machinery support comprising a pan fitting into the enclosure formed by said slabs, a concrete foundation in the pan, said pan having continuous bottom and side walls, said side walls engaging the inner faces of the slabs to absorb horizontal vibrations resulting from torque incident to the operation of machines rotating at high speeds, flanges carried by the upper edges of the side walls of the pan and resting on the upper ends of said cork slabs to impart vertical vibrations thereto and cause the slabs to absorb and prevent the transmission of vertical vibrations to the sub-base, said flanges also supporting the pan on the slabs to suspend the bottom wall of the pan above the horizontal surface of the sub-base to provide a trapped air pocket between the pan and the horizontal surface of the sub-base.

SIEGFRIED ROSENZWEIG.