(No Model.) 2 Sheets—Sheet 1.

J. A. CALANTARIENTS.

MEANS FOR THE CONSTRUCTION OF SURFACES FOR SKATING, &c.

No. 337,128. Patented Mar. 2, 1886.

Fig. 1.

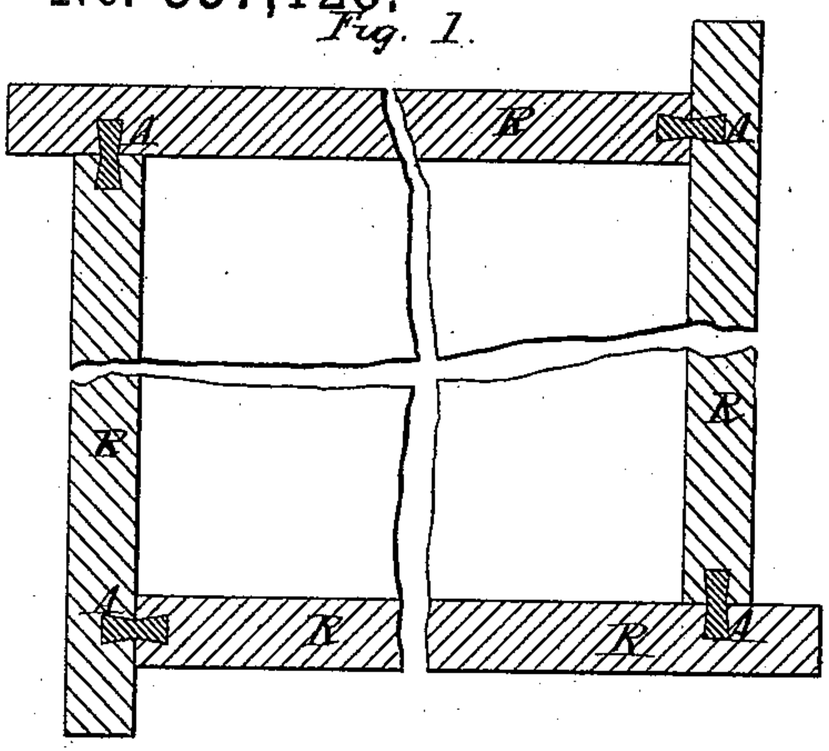


Fig. 2.

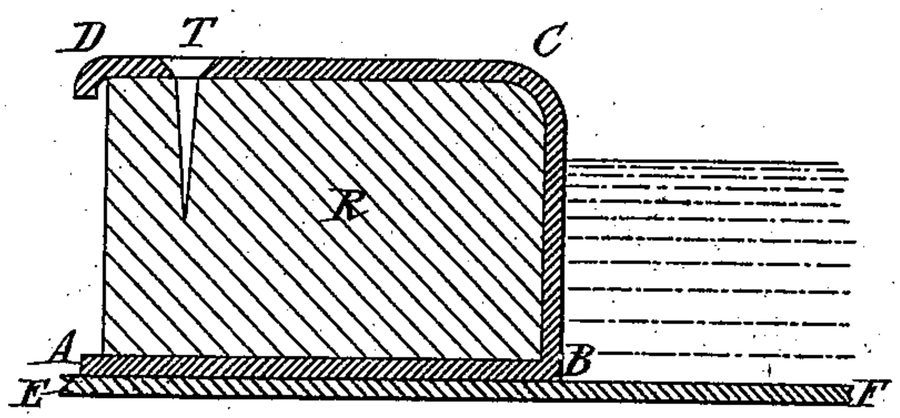


Fig. 3

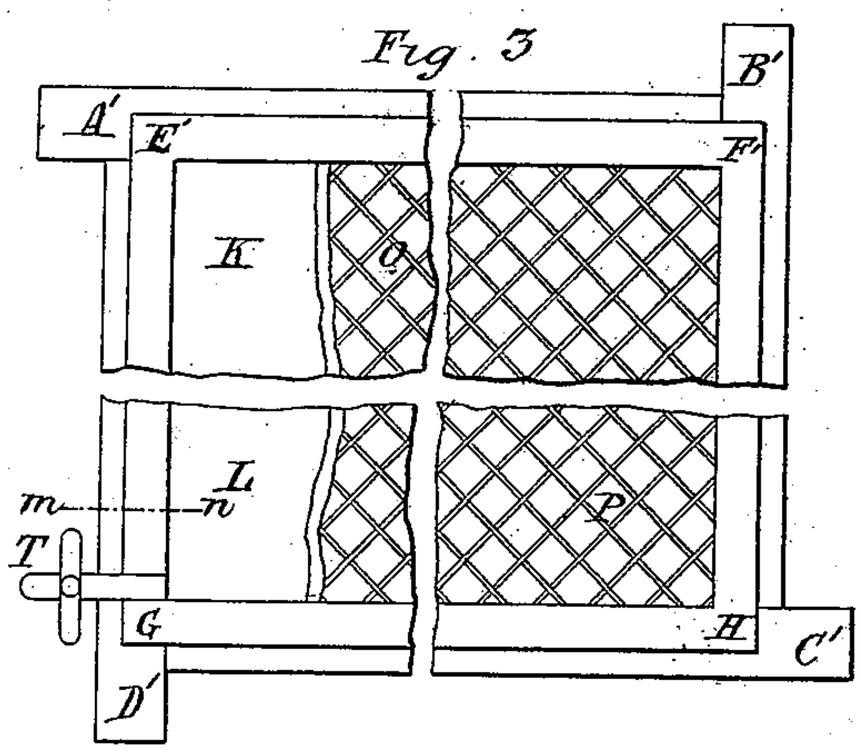


Fig. 4

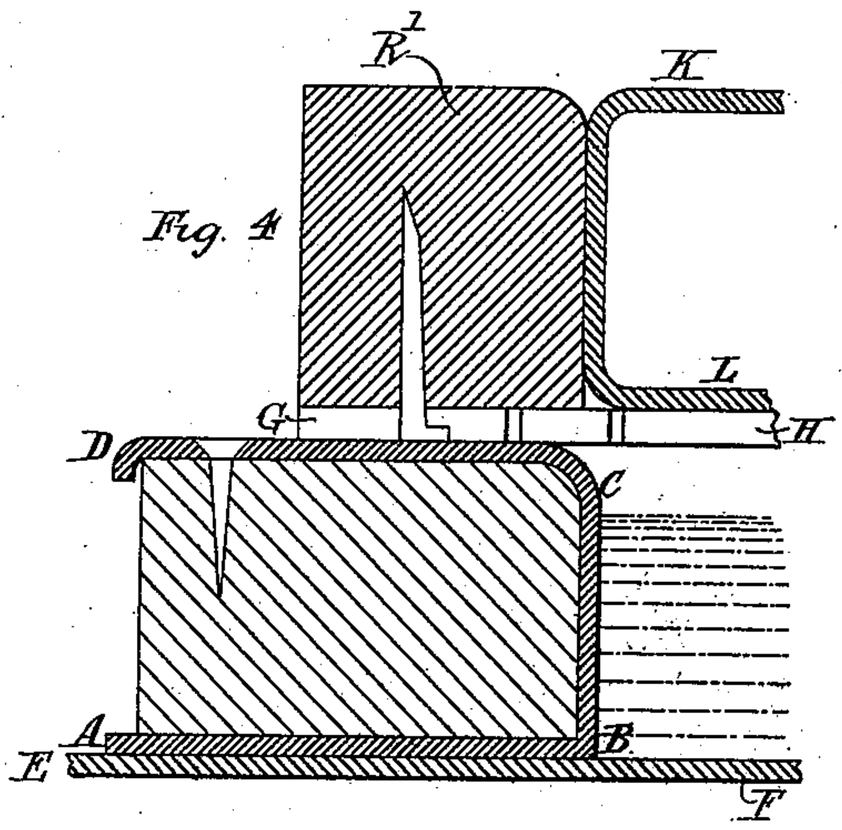


Fig 8

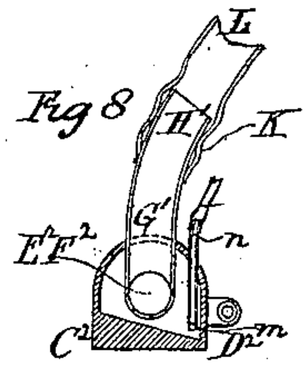
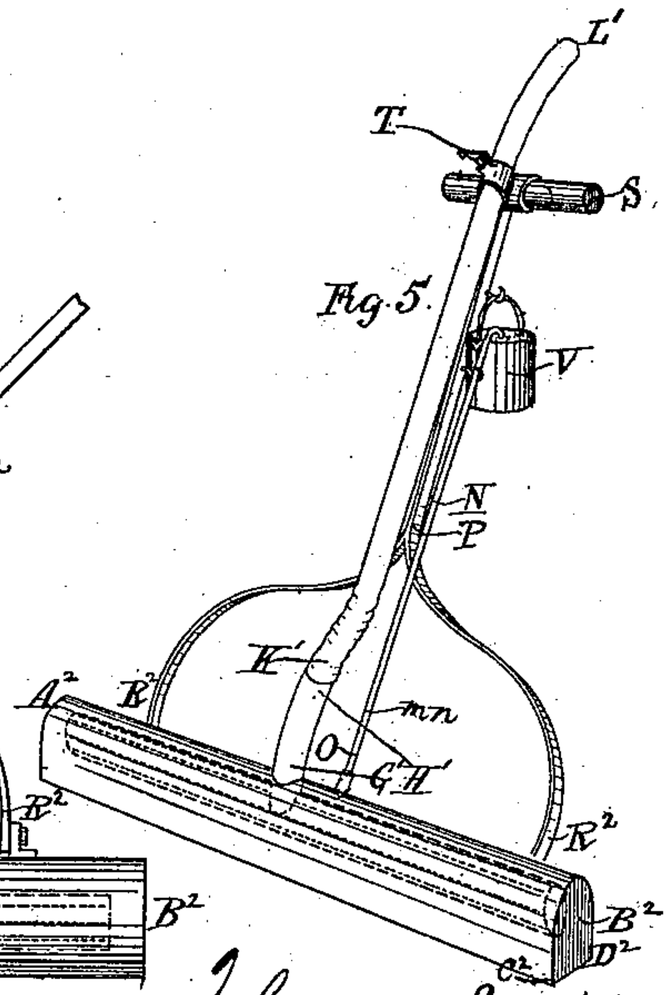


Fig 6

Fig. 7

Fig. 5.



Witnesses:
Philip A. Mann
C. J. Hedrick

Johannes Arctician Calantarients
by A. Pollok
his attorney

(No Model.) 2 Sheets—Sheet 2.

J. A. CALANTARIENTS.

MEANS FOR THE CONSTRUCTION OF SURFACES FOR SKATING, &c.

No. 337,128. Patented Mar. 2, 1886.

Fig. 12.

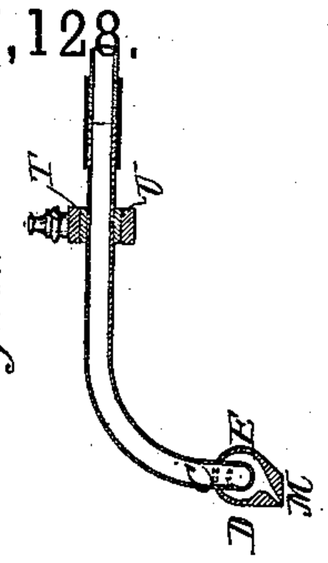


Fig. 9.

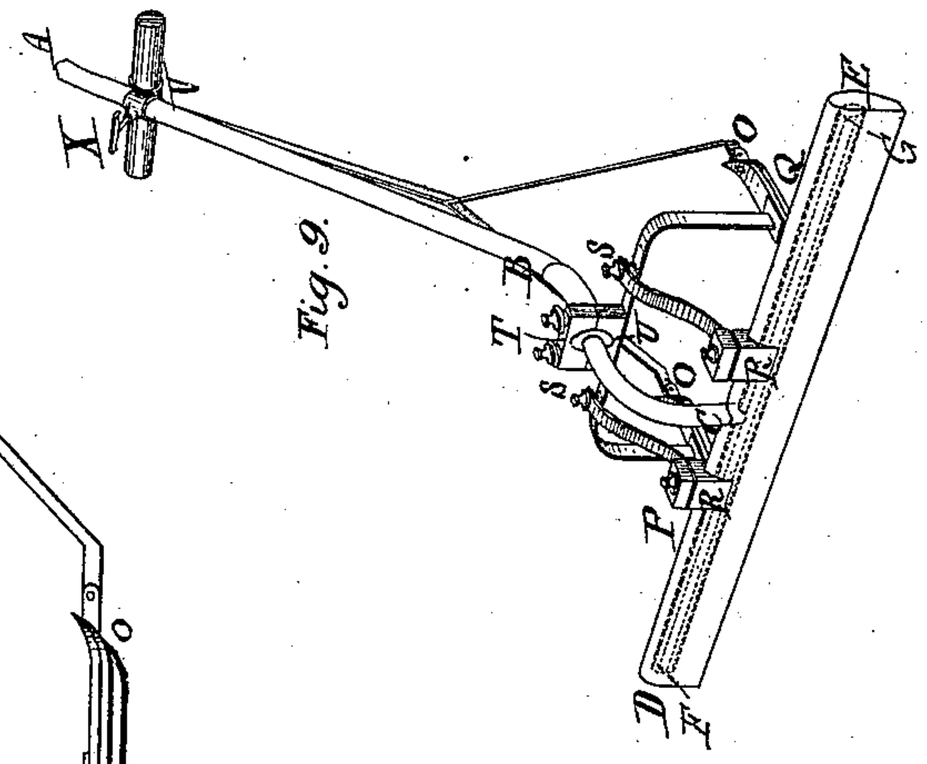


Fig. 11.

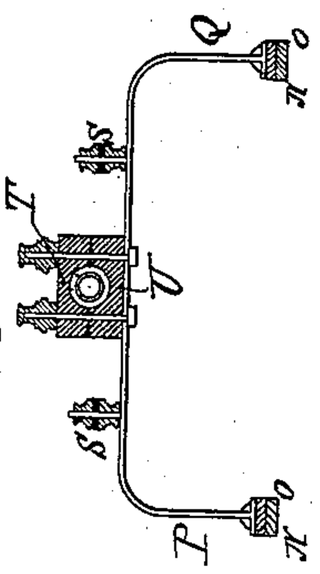


Fig. 13.

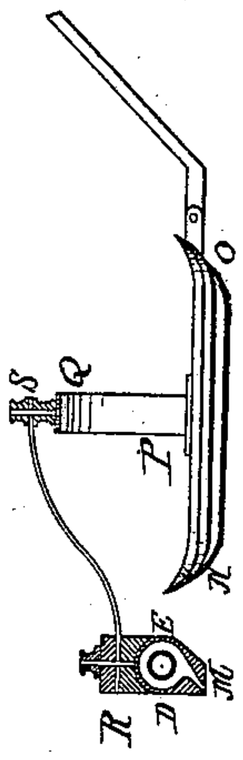


Fig. 14

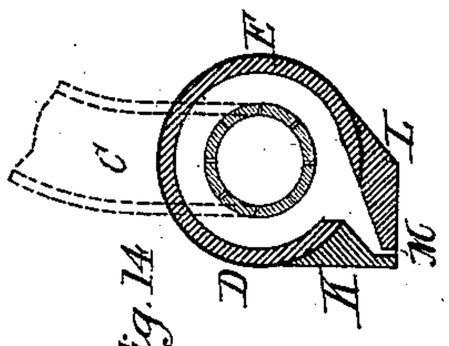
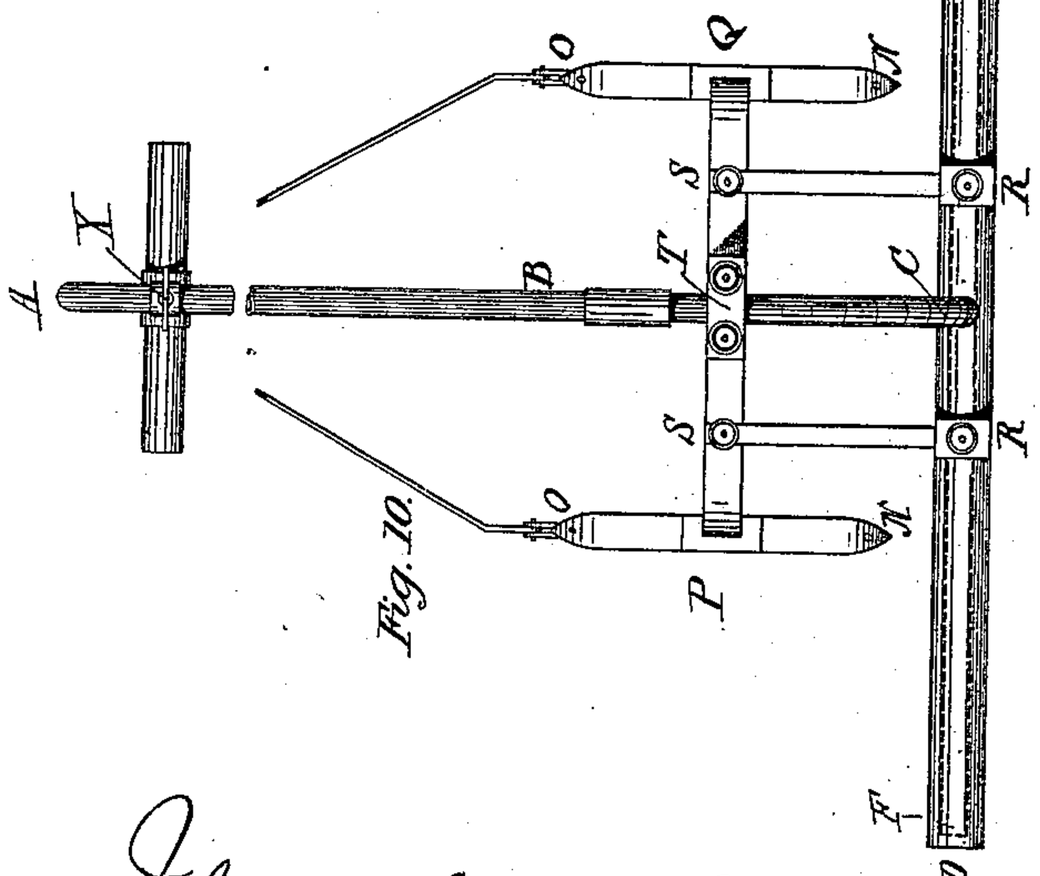


Fig. 10.



Witnesses:
Philip Mauro
C. J. Hedrick

Inventor:
Johannes Apostolicus Calantarients
by A. Pollok
his attorney

UNITED STATES PATENT OFFICE.

JOHANNES A. CALANTARIENTS, OF SCARBOROUGH, COUNTY OF YORK, ENGLAND.

MEANS FOR THE CONSTRUCTION OF SURFACES FOR SKATING, &c.

SPECIFICATION forming part of Letters Patent No. 337,128, dated March 2, 1886.

Application filed November 18, 1885. Serial No. 183,247. (No model.) Patented in England December 22, 1876, No. 4,947.

To all whom it may concern:

Be it known that I, JOHANNES AVETICIAN CALANTARIENTS, doctor of medicine, a subject of the Queen of Great Britain and Ireland, and residing at Scarborough, in the county of York, England, have invented certain Improvements in Means for the Construction of Surfaces for Skating and Sliding Upon, of which the following is a specification.

My invention has for its object to provide means for the construction of a surface to be used for skating and sliding upon in substitution for ice; and it consists in an improved method of and apparatus for treating crystalline substances for the production, renewal, and maintenance of such a surface, as hereinafter described. The substances I use for the above purposes are chiefly such of the crystalline salts or compounds of sodium, potassium, magnesium, ammonium, aluminium, and of similar metals, such as the carbonates, phosphates, sulphates, sulphites, hyposulphites, nitrates, borates, acetates, tartrates, and the like as possess such physical properties that they are solid at ordinary atmospheric temperatures, but are capable of being easily fused by heat into a liquid, that they are not hygroscopic, or only very slightly so, and that they are capable, when required, of being made to assume a smooth and slippery surface. The salts which I have found best suited for my purpose are those of sodium, especially those which contain water of crystallization.

I sometimes construct a skating-surface of those of the crystalline substances mentioned, which are devoid of slipperiness, for the purpose of being skated upon with roller-skates.

The manner in which I proceed to prepare my skating or sliding surface is as follows: In a covered building I prepare a perfectly level water-tight floor of the required area and of any suitable material, such as asphalt, cement, fine concrete, galvanized or tinned sheet-iron, sheets of zinc or lead soldered or riveted together, or a firm closely-fitting wooden floor may be used, the edges of the floor being raised to a sufficient height to prevent the fluid running off. In cases where it is doubtful whether the floor is thoroughly water-tight I can secure its water-tightness by covering it with water-proof sheeting, the edges of the water-proof sheeting being fastened together by solution of india-rubber or other suitable material. In the case of a well-made wooden floor, instead of covering the whole floor with water-proof sheeting, for the sake of economy I fasten strips of the sheeting over the joints between the boards, or wherever else required, by means of solution of india-rubber, or in other suitable manner, and so render the floor water-proof. I then by means of heat melt the crystalline substances above referred to, either singly or a mixture of any two or more of them, in any suitable vessel made of such a material as would not be injuriously affected by the said substances, and thereby reduce it into a liquefied state, frequently stirring until the fusion is complete. If there be any impurities in the melted mass, I strain them off, pour the melted mass onto the prepared floor until it stands at the required height and thickness—such, for example, as from half an inch to an inch and a half, or more—and by allowing the mass to congeal or solidify I form an ice-like surface for skating or sliding upon in any weather. The surface so formed resembles ice in its slipperiness, and also in the fact that ordinary skates can be used for skating thereon, the skates biting or cutting into it as on ice. If the congealed surface be not sufficiently smooth, I resort to the means for smoothing it hereinafter described, which means may also be resorted to for renovating the surface when it is cut up by skating. When the floor is too large to be covered by the contents of the melting-vessel, and it is inconvenient to do it all at once by using a large number of vessels at the same time, I lay it in portions of any convenient size—such as, for example, ten feet square, or ten feet by fifteen feet. The way I proceed is as follows: I mark out the exact boundary of the portion of the floor which the contents of the melting-vessel will cover to the requisite depth, and along this boundary, and for two or three inches outside it, I fasten to the floor, or the water-proof material covering it, a ribbon of water-proof sheeting—say, about nine inches wide—so that the unfastened portion falls to the inside of the boundary. I then take rims of wood, or other material, of the required length and depth, and lay them on the floor on the fastened portion of the water-proof ribbon up to the boundary-line. I temporarily fasten the rims together, and turn

the water-proof ribbon over the rims and fasten it down by tacks or otherwise. I then pour the melted crystals into the cradle or space so prepared, and when the crystals have quite solidified I remove the rims and peel off the water-proof ribbon from the side of the solidified mass and the floor, the rims and water-proof ribbons being used for a fresh portion of the floor until the whole is covered. If the skating-surface does not completely solidify on cooling, I warm the surface, and then allow it to cool, and, if necessary, repeat the process until the solidification is complete.

Figure 1 shows the aforesaid rims R R, temporarily fastened together at A A, the alternate end of each rim projecting for facility of removal.

Fig. 2 is a section throughout one of the rims R, showing the way in which the water-proof ribbon A B C D is fastened to the water-proof material on the floor E F from A to B, and thrown over the rims R from B to C and D, and fixed by tacks, as at T. The dotted lines represent the melted crystals. For the sake of clearness, four rims are shown in Fig. 1, but only two will be necessary, as the other two sides will be formed either by the edge of the floor or the solidified mass of artificial ice previously prepared.

Fig. 3 illustrates an apparatus for warming the surface, as before stated. I make a light frame-work, E′ F′ G H, of wood or other material, of the same size as the portion of skating-floor to be acted upon, and tightly stretch over and fix upon it a support of galvanized iron-wire netting or equivalent perforated, reticulated, or permeable material, O P. I place this sieve-like frame over the skating-floor or the cradle, A′ B′ C′ D′, and place upon it a flat bag, K L, of india-rubber or other suitable material, and of the same size as the frame. I then fill the bag with steam or heated air through the tap T, and keep it full until the skating-surface has become warm. I then discontinue the supply of steam or heated air, remove the frame E′ F′ G H, and allow the floor to cool. If necessary, I repeat the operation until the floor becomes sufficiently solid.

Fig. 4 is an enlarged section on the line *m n*, Fig. 3. A B C D and E F refer to the same parts as in Fig. 2. R′ is section of the frame supporting the support G H, upon which is placed the bag K L. When preparing the skating-surface in very cold weather, I may place this support over the cradle directly after the melted crystals are poured into it and throw a sheet or covering over until the ice has congealed. This plan insures solidification from the bottom upward, and prevents the formation of air-spaces underneath a thin superficial layer of ice.

Another way of effecting a rapid solidification of the skating-surface is the following: I warm the surface-fluid and the skating-floor by means of an apparatus somewhat like the one represented in Figs. 5, 6, 7, and 8.

Fig. 5 represents the apparatus complete; Fig. 6, a plan of Fig. 5; Fig. 7, a section through R^2 A^2 B^2 of Fig. 6; Fig. 8, section through H′ G′ of Figs. 5 and 6.

The apparatus consists of a hollow metallic cylinder or box, A^2 B^2, Figs. 5 and 6, closed at the ends and flattened longitudinally on the side touching the floor, as seen at C^2 D^2, Figs. 5, 7, and 8. In the inside of the box or cylinder A^2 B^2 is fixed a perforated metallic tube, E^2 F^2, extending to within a short distance of the ends of the box A B. The tube E^2 F^2 communicates at its middle at right angles with a short metallic tube, G′ H′, Figs. 5, 6, and 8. Over the end H′ of the tube G′ H′ is fixed a flexible hose, K′ L′, for the admission of steam.

T is a tap, to shut off or admit steam, as required.

m n, Figs. 5 and 8, indicate a small metallic tube fixed in the cylinder A^2 B^2 at its middle, so that the lower aperture, *m*, of the tube *m n* nearly touches the lowest part of the floor of the box A^2 B^2, which is made slanting toward *m*, as shown in section at C^2 D^2. Over the upper end, *n*, of the tube *m n* is fastened a flexible tube, N O, Fig. 5, which bends at O into a vessel, V, suspended from the handle of the apparatus.

R^2 P S is the handle, jointed at R^2 R^2.

When required for use, steam is admitted through the hose L′ K′ and tube H′ G′ into the tube E^2 F^2, the perforations in the said tube E^2 F^2 helping to distribute the steam throughout the cylinder or box A^2 B^2 and heating it evenly. As the steam condenses, the water gravitates toward the tube *m n*, and is forced by the pressure of steam through the tubes *m n o* into the vessel V. The apparatus being thus kept hot, I place it on the skating-floor and traverse it thereover until the surface-fluid has become warm. I then remove the apparatus and allow the liquefied mass to cool and solidify.

I sometimes make the metallic box A^2 B^2 wide in the direction of C^2 D^2, thus giving the apparatus a flat oblong or square form, and place it on skates, wheels, or runners in such a manner that the flat bottom of the box A^2 B^2 C^2 D^2 just clears the skating-floor without touching it.

When the skating surface is required to be dried or otherwise acted upon, I heat the apparatus as above described, and traverse it over the floor, the radiation of heat from the bottom of the box A^2 B^2 C^2 D^2 against the floor effecting the object required.

Sometimes, when any particular floor is to be covered only temporarily, for the sake of convenience I resort to the following expedient: I take a number of pieces of board or other material say half an inch thick, and of any convenient size—such as, for example, one foot square or one foot by two feet—so prepared that when laid flat on the floor side by side they fit into or interlock with one another. I have also a few rims prepared of wood or metal that can be temporarily fast-

ened to the edges of the boards at right angles, so as to form a number of small trays, which are made water-tight in the manner hereinbefore described. I pour the prepared fluid mass into these trays, taking all the precautions herein described, and when the mass has become sufficiently solid I remove the edges or rims, leaving the ice substitute adherent to the board. I then melt off the irregularities of the surface by means of the apparatus shown at Fig. 5, taking care that the thickness of ice substitute left on the several pieces is exactly equal. These then can be carried to any room, laid side by side closely like tiles, and further smoothed by steam in the manner hereinafter described for renovating the surface. This last process will also serve to fill up the interspaces between the blocks, the interspaces between the trays being made water-tight beforehand. It is then fit for skating. When required to be removed, they can be lifted off one by one and stored away in a damp situation for further use.

The crystals of carbonate and of suphate of soda can be used alone, or mixed in any proportion, for the purposes of my invention; but a mixture of about one part of carbonate and from one to seven of sulphate of soda, treated as above described, forms an admirably dense and slippery skating or sliding surface. So, likewise, does phosphate of soda alone or mixed in any proportion with carbonate or sulphate of soda; also, sulphite of soda answers well; but at present the prices of phosphate and sulphite of soda and of some others are too high as compared with the other chemical preparations I have enumerated to render their use generally practicable where expense is a consideration. When the crystals of carbonate and sulphate of soda are used separately, it is desirable on melting to raise their temperature to the boiling-point of water before pouring on the skating-floor; but when a mixture of equal parts of carbonate and of sulphate of soda are used the temperature of the melted mass need not exceed 120° Fahrenheit. As a rule, the lower the atmospheric temperature at the time the skating-surface is being prepared the higher I make the temperature of the melted crystals before pouring them on the floor, so as to insure as dense and as transparent a surface as possible.

With regard to carbonate of soda (soda crystals) or sulphate of soda (Glauber's salt,) if found more economical or convenient, I can use the substances themselves, and by mixing them with hot water produce the crystals whenever required. The same treatment may be extended to such of the other salts as will crystallize in the same way.

When the surface is required to be skated upon with roller-skates, then I prepare the surface from those of the crystalline substances hereinbefore mentioned which are devoid of slipperiness, such as alum or hyposulphite of soda. Sometimes I apply these non-slippery salts to the surface of the slippery skating-surface, and so make it suitable for skating on with roller-skates, such as by sprinkling powdered hyposulphite of soda over the surface, and then melting it in by means of steam in the manner hereinafter described for renovating the surface.

A great advantage from the use of the above-mentioned surface is that when much cut or scratched it can readily be renovated.

To effect the renovation and smoothing of the surface, I apply heat thereto, so as to melt a fine layer of the material of such surface, and with it the irregularities and powder formed on it, whether by skating or efflorescence, and allowing it to solidify, which it speedily does, and forms a smooth surface. If necessary, the process may be repeated until the surface becomes sufficiently smooth.

The application of heat to the surface may be effected in a variety of ways, one of which I shall describe by way of illustration.

In Figs. 9, 10, 11, 12, 13, and 14 I have shown a convenient means by which the heat of steam may be used for this purpose. Fig. 9 represents a side view of the apparatus for applying steam; Fig. 10, the plan. Fig. 11 is a section through P Q of Figs. 9 and 10. Fig. 12 is a section through B T C of Figs. 9 and 10. Fig. 13 is a section through R S of Figs. 9 and 10; and Fig. 14 is an enlarged view of D C E M of Fig. 12 or transverse section through D E of Fig. 9.

The same letters indicate corresponding parts in all the figures.

A boiler for generating steam being placed outside in any convenient locality, the steam is conducted by means of a flexible pipe or tube (marked A B, Fig. 9) into the building or place where the skating-surface is to be acted upon. The pipe A B is fastened at B to the metallic tube B C. The tube B C opens at C into a horizontal metallic tube, F G, which is perforated all over and fixed in the middle of a much larger metallic tube or cylinder, D E, extending throughout its entire length. The tube D E is closed at both ends, but has a slit along the entire length of its under portion. Two strips of metal, K and L, Fig. 14, are fastened along the outside of the tube D E, one on each side of the slit, the free edge of the inner strip, L, inclining toward the outer one, K, so as to leave a very fine and perfectly even slit, M, throughout the length of the tube D E, facing downward. By this arrangement of the strips the slit is brought forward as much as possible, so as to facilitate the application of steam to the extreme borders of the skating-floors. The steam enters through the tubes A B C into the tube F G and issues through the perforations in its circumference and becomes evenly distributed throughout the interior of the tube D E, and then issues through the slit M in a fine even stream, impinging with some little force directly against the skating-surface. The area of the slit is made equal to or a little less than the area of the pipe conveying the steam. These tubes

are supported by a flat piece of metal, P Q, Fig. 9, the ends of which bend downward and are fixed to a pair of skates or carriers, N O N O, Figs. 9 and 11, each consisting of an upper flat piece of metal with the ends curved upward, and an under piece of the same shape and size made of a non-corroding substance, such as glass, glazed porcelain, or earthenware, or even hard wood, the two pieces being well fastened together and the lower having its edges well rounded off.

T U, Figs. 9 and 11, are two blocks of a non-conducting material, such as wood, hollowed out to inclose the steam-pipe B C between them, and are fastened together and to P Q by screws.

S R S R are two strong metallic rods, one on each side of the tube B C, which help to support the tube D E and keep it at a height just sufficient to clear the skating-surface.

O O V represent the handle by means of which the apparatus is moved about. Should it be required to give additional steadiness to the apparatus on its skates or carriers, the ends O O may be joined together by a metallic bar the weight of which is equivalent to that of the tube D E.

X is a tap interposed in the tube A B and fixed on the handle V, by which tap steam is admitted and regulated or shut off, as required.

When the skating surface is to be smoothed or renovated, all that is required is to put the apparatus in position on the surface, turn the steam on, and move along with it at a walking pace. The steam, by issuing with some force through the slit M in one continuous even stream and striking against the surface, melts it, and as the whole surface is traversed a fine pellicle or film including any powder formed by the action of the skates or effloresence on the surface is melted, and this portion so melted soon solidifies and presents a smooth surface again for skating upon. If one application of steam be not sufficient to smooth the surface, the application may be repeated until the required smoothness is obtained.

I have represented only one tube D E in the drawings, but of course two or more may be used, if desired, the tubes being fixed closely and parallel to one another, with a branch from the tube B C to each. Their length also may be varied, although four to six feet is a convenient length for a skating-floor of moderate size. Both the length and number of tubes must bear a relation to the size of surface to be renovated. The greater number, by necessitating a more rapid movement, enables a larger extent of surface to be acted upon in a given time, and the greater length, by covering a larger surface, shortens the time in which the work can be finished.

The size of the boiler as the source of steam will have to be made in proportion to the size of the surface to be renovated, and the diameter and strength of the pipe conveying steam from the boiler to the steaming apparatus will also have to be proportioned to the quantity and pressure of steam required.

It is desirable to use steam under some pressure, so as to avoid its condensation into water by loss of heat in passing through the tubes, and also to prevent unnecessary moisture being imparted to the surface under treatment. On no account should drops of water be allowed to fall on the ice from the steaming apparatus. The degree of pressure must depend upon the temperature of the atmosphere at the time, the lower temperature necessitating a higher pressure of steam. The tap at X is operated to regulate the force with which the steam strikes against the skating-surface.

Should it be found desirable to dry the steam further before it comes in contact with the skating-surface, I lengthen the tube B C into a spiral and keep it hot by means of a lamp or otherwise.

It is always desirable to place the steaming apparatus on a clean tray of some kind, and let the steam pass through to get it thoroughly hot and dry before placing it on the ice for the purpose of steaming.

The exposed parts of the instrument may be covered with some non-conducting material, so as to prevent loss of heat.

If the skating-surface in course of time becomes dirty by accumulation of dust or other causes, I easily clean it in the following manner: I apply the steaming apparatus in the same way as for renovating the surface, but instead of allowing the fine melted layer to solidify I mop it up quickly, and so remove with it all the dirt from the surface. If desired to make up for this small loss of material, an equal quantity of powdered clean material may be sprinkled over the skating-surface and melted thereon, as hereinbefore described.

To prevent the skating-surface from effloresc-ing in dry weather, I wet it occasionally; or, if effloresence has already occurred, I steam it with the apparatus above described, and thus supply to the crystals not only the moisture they have lost, but the very conditions of temperature for reforming their crystalline structure.

When not in use, the surface may be covered over with some water-proof material as a protection against efflorescence and to keep it clean. The atmosphere may also be kept charged with moisture in a most agreeable manner by means of fountains, plants, and flowers, which, combined with the evaporation from the skating-surface, will keep the air of the room cool and pleasant.

In situations where the atmosphere is very dry, in addition to the above, pure air, saturated with moisture, may be forced into the building where the surface is laid, which forcing in of air may be effected in any suitable manner—such as by means of pipes arranged round the borders of the skating-floor and connected with a chamber fitted with a rockery kept moist by cold water constantly dripping over it.

A great advantage of this surface is that it

does not cause an unpleasant and dangerous difference of temperature between the air outside and in, as is the case with real ice; and as skating on it causes no dust to fly about, the atmosphere is, as compared with that in a rink in which roller-skates are used, comparatively free from dust. If it be desired that elasticity should be imparted to the surface, this can be effected by making the skating-floor rest upon india-rubber cords or pieces of india-rubber, springs, sawdust, curled hair, or other elastic substances.

If desired, color may be given to the surface by tinting the floor with the required color before covering it with the substance that is to form the skating-surface. As the ice substitute is transparent or translucent, it appears of the same color as the floor on which it rests; or a small quantity of any desired coloring-matter may be added to the melted crystals before pouring on the floor when the skating-surface is being prepared.

I claim—

1. The method of preparing surfaces for sliding and skating upon by liquefying salts or compounds such as described, pouring the same upon a floor or surface, allowing it to cool, and finally rendering it smooth and solid by application of heat, as set forth.

2. The method of preparing surfaces for sliding or skating upon by fastening successively upon portions of the floor, so as to inclose a space, water-proof material and rims, and then pouring into the space thus inclosed a mass of liquefied salts or substances of the character hereinbefore defined, and allowing the mass to solidify, and then removing the rims and water-proof material, and repeating the operation until the entire surface is formed, substantially as hereinbefore described.

3. The method of preparing or renewing surfaces of the character described for skating and sliding upon, by forming a surface of salts or compounds such as specified, and heating such surface by steam or hot air, substantially as set forth.

4. The method of preparing surfaces for skating or sliding upon, by taking salts or compounds of the character hereinbefore defined, liquefying them, and pouring the liquefied mass upon a floor or surface, and placing over this mass a support for sustaining a sheet or covering thereover, to insure solidification of the mass, substantially as hereinbefore described.

5. In the construction or renewal of surfaces such as described for skating and sliding, the improvement consisting in traversing over the same an apparatus heated substantially as set forth.

6. In the construction or renewal of surfaces of the character described for skating and sliding upon, the improvement consisting in applying to said surface, in direct contact therewith, a current of steam, substantially as set forth.

7. The method of preparing surfaces for skating or sliding upon, by taking boards or supports formed to fit together and forming them into temporary trays, and pouring into them liquefied salts or compounds of the character hereinbefore defined, then, when the liquid mass has solidified, removing the edges of the trays and placing the boards or supports together side by side, and leveling the surface thus formed, substantially as hereinbefore described.

8. The method of preparing surfaces for skating or sliding upon, by taking salts or compounds of the character hereinbefore defined and liquefying them, then preparing a yielding or elastic surface or floor by supporting flooring boards or sheets or plates upon india-rubber cords or springs or upon sawdust or horse-hair or the like, and then pouring the liquefied mass of salts or compounds upon the said yielding or elastic surface or floor, and allowing the mass to solidify, substantially as hereinbefore described.

9. The apparatus for use in preparing sliding or skating surfaces of the character described, consisting of a box or receptacle, means for supplying heat or a heating agent thereto, and runners or similar means for traversing the same over said surface in close proximity thereto, substantially as set forth.

10. The portable heating apparatus for use in preparing and renewing surfaces composed of salts or compounds such as specified, said apparatus comprising a long box or receptacle having a slit or opening in its lower surface, and means for supplying steam to said box or receptacle, so that a current of steam is caused to issue therefrom against the surface traversed, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

J. A. CALANTARIENTS.

Witnesses:

WM. JAS. COOK,
Solicitor, Scarborough, England,
GEORGE BLOW MAFIELD,
His Clerk.