July 13, 1926. 1,592,218

L. MOTZKO

ARRANGEMENT FOR DRAINING OR DRYING DAMP WALLS

Filed April 17, 1925 3 Sheets-Sheet 1

*Fig. 1.*

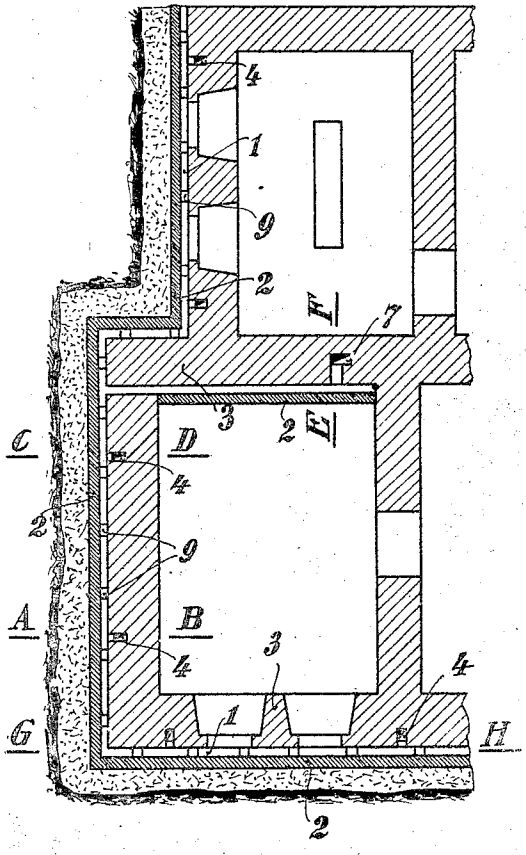



*Fig. 2.*

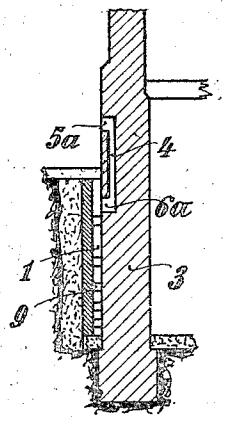
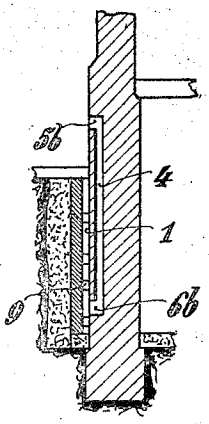



*Fig. 3.*



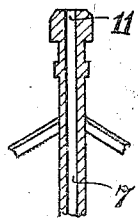
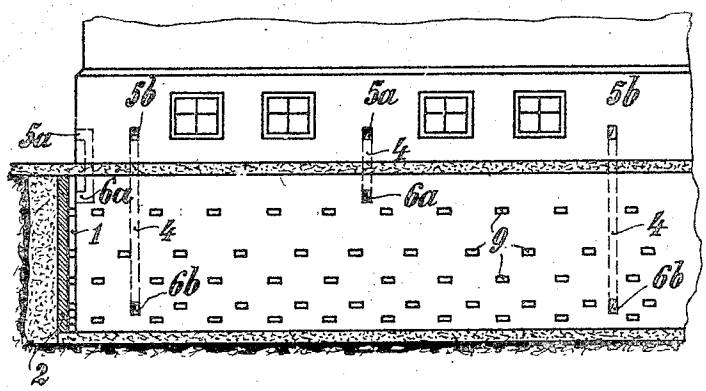
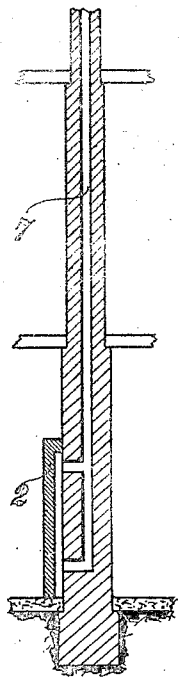




*Fig. 4.*

*Fig. 5.*




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*Fig. 9.*

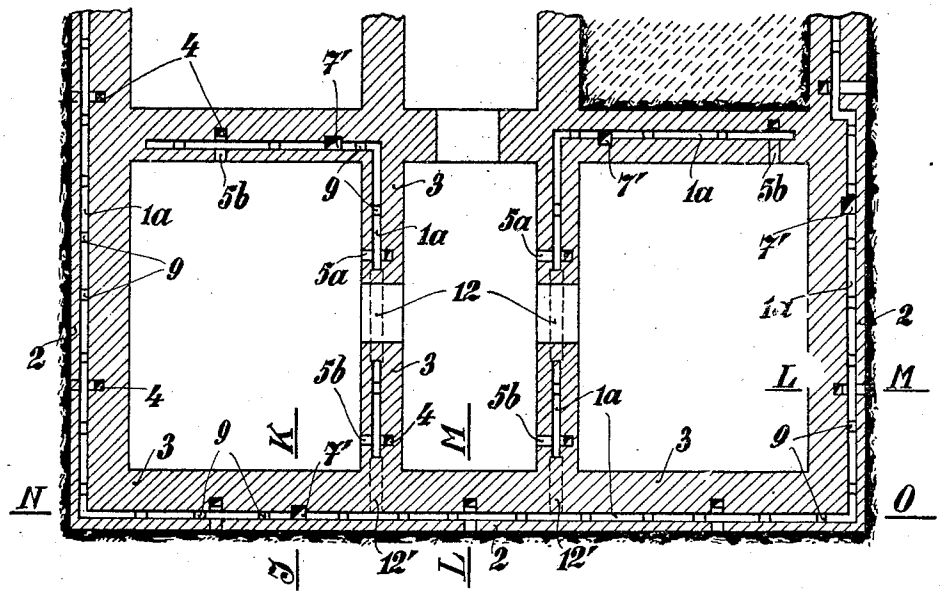



*Fig. 6.*

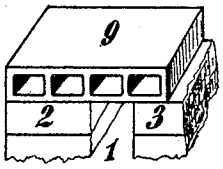
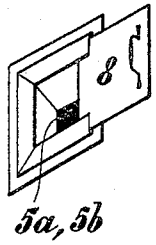



*Fig. 7.*




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ARRANGEMENT FOR DRAINING OR DRYING DAMP WALLS

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Fig. 8.

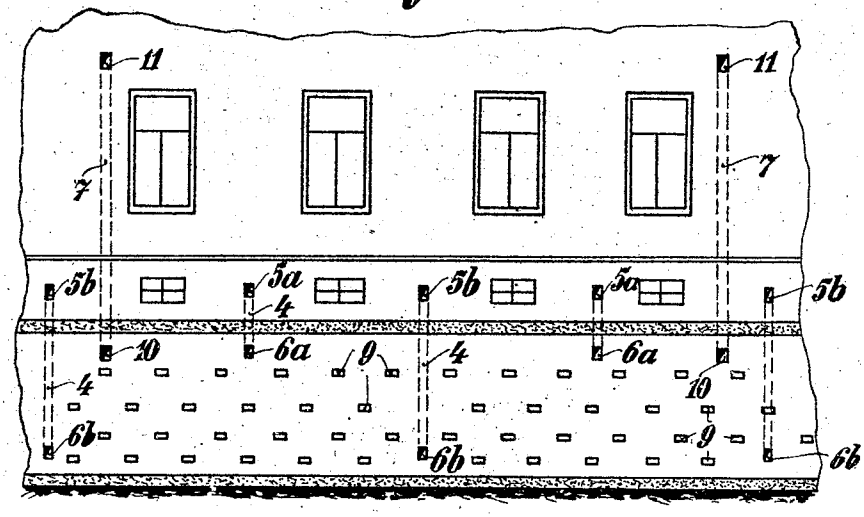



Fig. 10.

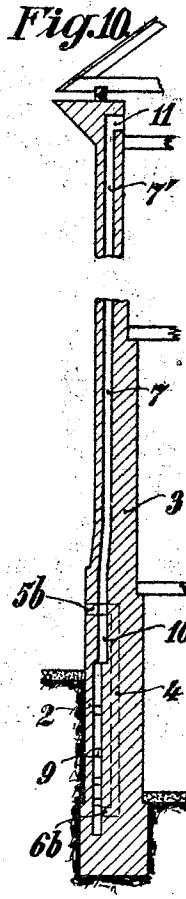



Fig. 12.

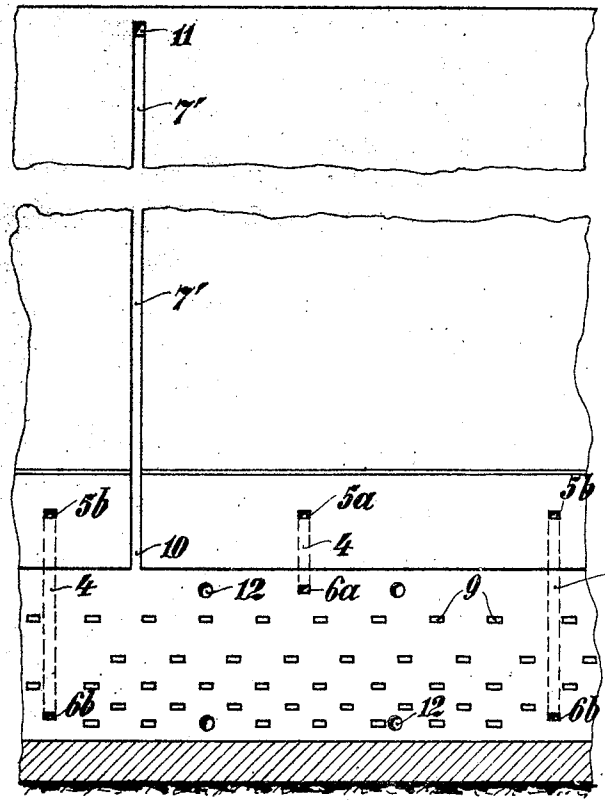
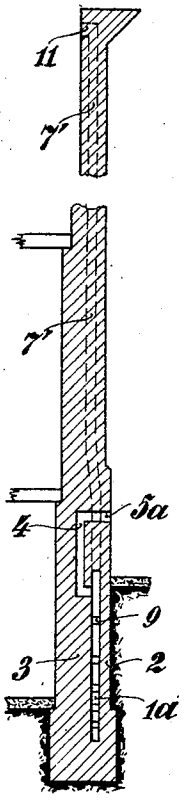



Fig. 11.




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Patented July 13, 1926. 1,592,218

# UNITED STATES PATENT OFFICE.

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## ARRANGEMENT FOR DRAINING OR DRYING DAMP WALLS.

Application filed April 17, 1925, Serial No. 23,799½, and in Austria July 5, 1924.

This invention relates to improvements in arrangements for draining or drying damp walls of the kind in which at the side of the wall or within the same hollow spaces or chambers are arranged, which are in communication with the outside air.

However in these known arrangements the atmospheric conditions, changing or varying according to the season, have not been taken into consideration in a corresponding manner, so that a satisfactory operation during the whole year is very doubtful and the success depends very frequently on accidental gusts of wind.

The present invention has for its object to render effective the drainage arrangement during the whole year by making use of the changing or varying atmospheric conditions. In carrying out the present invention, the essential feature of the same consists in that the hollow space or chamber, provided at the side of or within the wall, is in communication with the outside air, on the one hand by means of channels or passages disposed in or at the wall, whereby the outer ends of the said passages are arranged above the hollow chamber, while their inner ends are disposed alternately in the top and bottom parts of the hollow chamber, and on the other hand by means of passages beginning in the top part of the hollow chamber and terminating higher than the outer ends of the said channels.

Some modes of carrying out the present invention are illustrated by way of example on the accompanying sheets of drawing in which.

Fig. 1 is a plan view of a part of a building with walls which have to be dried or drained.

Figs. 2, 3 and 4 are sectional views, the sections being taken on lines A—B, C—D and E—F respectively of Fig. 1.

Fig. 5 is a sectional view on line G—H of Fig. 1.

Figs. 6 and 7 illustrate details on an enlarged scale.

Fig. 8 is a view similar to that shown in Fig. 5 of a modified consfruction.

Fig. 9 shows in plan view an arrangement for new buildings.

Figs. 10 and 11 are sectional views the sections being taken on lines J—K and L—M respectively of Fig. 9.

Fig. 12 is a longitudinal section taken on line N—O of Fig. 9.

The hollow space or chamber 1 (Figs. 1 to 6) extends in the basement at the outside of the damp wall 3 and is separated from the soil by a wall 2 and at the top by the pavement. In case of new buildings the hollow space or chamber $1^a$ (Figs. 9, 10 and 11) is arranged already within the wall. The brick-wall floor or bottom of the hollow space or chamber is disposed at such a depth as it is necessary owing to the conditions of the underground water and gradient or incline, and a suitable drain is arranged in order to provide for any unexpected rising of the underground water-level. Vertically disposed air passages 4 (Figs. 1, 2, 3, 5, 9, 10, 11 and 12) are arranged in the damp wall. At $5^a$ and $5^b$ respectively (Figs. 2, 3, 5, 8, 9, 10, 11 and 12) above the hollow space, these passages establish communication with the outside air and at the bottom communicate with the hollow space. The lower ends of the said air passages 4 alternately terminate at $6^a$ and $6^b$ in the top part and bottom part respectively of the hollow space (Figs. 2, 3, 5, 8, 10, 11 and 12).

The outside air, entering the hollow space or chamber, passes along or within the wall, takes up its moisture and, according to Fig. 1, passes through a channel in the middle wall and into an airing or ventilation flue 7 extending to the roof, or according to Figs. 8, 10, 11 and 12 the damp air is conducted from the hollow space directly into the atmosphere at 11 or into the attic by means of a passage 7′. This modification is employed in case it is not possible to extend the passage right up to and beyond the roof. The hollow space 1 or $1^a$ is bridged by hollow binders 9 of porous material, such as clay or the like. These hollow binders not only strengthen the wall against the pressure of the earth and of the wall, but also facilitate and hasten the drying, because in consequence of their capillarity they take on the moisture of the wall and deliver the same to the air passing by or through the wall. The hollow stones are arranged more close at the bottom particularly in view of

the fact, that the pressure as well as moisture increase toward the bottom. The openings $5^a$ and $5^b$ are provided with slides 8 (Fig. 7), in order to regulate the drying process.

The arrangements acts in the following manner:—

The air current within the arrangement differs according to the atmospheric conditions. In case the temperature of the outside air is lower than the temperature within the hollow space or chamber (for instance in winter), the cold outside air enters into the hollow space $1^a$ or $1^b$ by means of the openings $5^a$ or $5^b$ and the vertical channels and passes along the damp walls. Thereby the temperature of the air is increased and in consequence thereof its volume is increased and thus it will gradually take up more aqueous vapour. In consequence of the increasing temperature and degree of moisture the air becomes lighter and passes into the atmosphere or attic by means of the passages 7 or 7'. The rate of flow of the air will increase in accordance with the increasing dampness of the wall and with the increasing difference in temperature and weight between the incoming and out-going air, as well as with the difference between the inlet and outlet openings. However in case the temperature of the outside air is higher than that within the hollow space or chamber (for instance in summer), the warm outside air enters from the top through the passage 7 and thereby is cooled off somewhat without passing beyond the thaw point (limit of condensation). The air, which has become heavier owing to the cooling off and entered the hollow space, will become lighter again owing to the absorption of moisture and, owing to the pressure-differences, pass through to the channels 4 and the openings $5^a$ or $5^b$ respectively into the atmosphere.

During the cold season the rate of flow is, of course, greater than during the warm season. However the full effect during the whole year is obtained by the alternately differently high positioning of the openings $6^a$ and $6^b$ and with the aid of the adjustable slides 8. In case the outside temperature is lower than the inside temperature it is of advantage to allow the air to pass in through the upper openings $6^a$ only by shutting the slides 8 of the openings $5^b$. In consequence of its greater specific gravity the cold air sinks to the bottom of the hollow chamber and is warmed up and takes up already the moisture and subsequently rises, whereby it becomes gradually warmer and takes up more and more of the aqueous vapour, until finally escaping into the atmosphere through the openings 10 and the passages 7 or 7' respectively.

In case the outside temperature rises considerably above the temperature within the hollow chamber, the air passing in through the passages 7 or 7' is allowed to pass only through the bottom openings $6^b$ and the passages 4 into the open by shutting the slides at $5^a$. Thereby the air entering the hollow chamber is forced to pass through the more damp lower part of the hollow chamber and to take up sufficient moisture. The necessity and mode of regulation can be determined by carrying out control measurings with the aid of any suitable instruments for measuring the speed or rate of flow, degree of moisture and temperature. The regulating slides also serve for effecting a uniform drying or drainage of the walls. In case of a very damp outside air the plant may be placed out of operation.

Of course the invention is not limited to the illustrated embodiments, as the same may be carried out in various ways without departing from the scope of invention. As shown in Fig. 9, the openings $5^a$ and $5^b$ may be arranged in the basement, in case it is desired to drain or dry the middle walls. If a door is disposed in such a wall (Fig. 9), the parts of the hollow chamber separated by the same are connected with each other by pipes 12 (Figs. 9 and 12) located above and underneath the door frame. The connection between the middle wall and the hollow space of the outer wall is accomplished by means of pipes 12'. In case of unfavourable underground water-conditions the arrangement may be combined with an automatically operative pumping arrangement, in order to lead out of the bottom of the hollow chamber the water freely coming in through the soil.

I claim.

1. An arrangement for draining or drying damp walls comprising a hollow chamber arranged at the side of the wall, channels in the wall for establishing communication between the hollow chamber and the outside air, the outer open ends of the said channels being arranged above the hollow chamber and the inner open ends of the same being disposed alternately in the top and bottom parts of the said hollow chamber, and a passage in the wall beginning in the top part of the hollow chamber and terminating higher than the said channels for establishing communication between the hollow chamber and the outside air.

2. An arrangement for draining or drying damp walls comprising a hollow chamber arranged within the wall, channels in the wall for establishing communication between the hollow chamber and the outside air, the outer open ends of the said channels being arranged above the hollow chamber and the inner open ends of the same being disposed alternately in the top and bottom parts of the said hollow chamber, and a passage in

the wall beginning in the top part of the hollow chamber and terminating higher than the said channels for establishing communication between the hollow chamber and the outside air.

3. An arrangement for draining or drying damp walls comprising a hollow chamber arranged, at the side of the wall, hollow binders of porous material arranged in and traversing the said chamber, channels in the wall for establishing communication between the hollow chamber and the outside air, the outer open ends of the said channels being arranged above the hollow chamber and the inner open ends of the same being disposed alternately in the top and bottom parts of the said hollow chamber, and a passage in the wall beginning in the top part of the hollow chamber and terminating higher than the said channels for establishing communication between the hollow chamber and the outside air.

4. An arrangement for draining or drying damp walls comprising a hollow chamber arranged within the wall, hollow binders of porous material arranged in and traversing the said chamber, channels in the wall for establishing communication between the hollow chamber and the outside air, the outer open ends of the said channels being arranged above the hollow chamber and the inner open ends of the same being disposed alternately in the top and bottom parts of the said hollow chamber, and a passage in the wall beginning in the top part of the hollow chamber and terminating higher than the said channels for establishing communication between the hollow chamber and the outside air.

5. An arrangement for draining or drying damp walls comprising a hollow chamber arranged at the side of the wall, channels in the wall for establishing communication between the hollow chamber and the outside air, the outer open ends of the said channels being arranged above the hollow chamber and the inner open ends of the same being disposed alternately in the top and bottom parts of the said hollow chamber, slides provided at the outer open ends, and a passage in the wall beginning in the top part of the hollow chamber and terminating higher than the said channels for establishing communication between the hollow chamber and the outside air.

6. An arrangement for draining or drying damp walls comprising a hollow chamber arranged within the wall, channels in the wall for establishing communication between the hollow chamber and the outside air, the outer open ends of the said channels being arranged above the hollow chamber and the inner open ends of the same being disposed alternately in the top and bottom parts of the said hollow chamber, slides provided at the outer open ends, and a passage in the wall beginning in the top of the hollow chamber and terminating higher than the said channels for establishing communication between the hollow chamber and the outside air.

7. An arrangement for draining or drying damp walls comprising a hollow chamber arranged at the side of the wall, hollow binders of porous material arranged in and traversing the said chamber, channels in the wall for establishing communication between the hollow chamber and the outside air, the outer open ends of the said channels being arranged above the hollow chamber and the inner open ends of the same being disposed alternately in the top and bottom parts of the said hollow chamber, slides provided at the outer open ends, and a passage in the wall beginning in the top part of the hollow chamber and terminating higher than the said channels for establishing communication between the hollow chamber and the outside air.

8. An arrangement for draining or drying damp walls comprising a hollow chamber arranged within the wall, hollow binders of porous material arranged in and traversing the said chamber, channels in the wall for establishing communication between the hollow chamber and the outside air, the outer open ends of the said channels being arranged above the hollow chamber and the inner open ends of the same being disposed alternately in the top and bottom parts of the said hollow chamber, slides provided at the outer open ends, and a passage in the wall beginning in the top part of the hollow chamber and terminating higher than the said channels for establishing communication between the hollow chamber and the outside air.

9. An arrangement for draining or drying damp walls comprising a hollow chamber arranged at the side of the wall, hollow binders of porous material arranged in and traversing the said chamber, the said binders being disposed more close at the bottom of the hollow chamber, channels in the wall for establishing communication between the hollow chamber and the outside air, the outer open ends of the said channels being arranged above the hollow chamber and the inner open ends of the same being disposed alternately in the top and bottom parts of the said hollow chamber, and a passage in the wall beginning in the top part of the hollow chamber and terminating higher than the said channels for establishing communication between the hollow chamber and the outside air.

10. An arrangement for draining or drying damp walls comprising a hollow chamber arranged within the wall, hollow binders of porous material arranged in and trav-

ersing the said chamber, the said binders being disposed more close at the bottom of the hollow chamber, channels in the fall for establishing communication between the hollow chamber and the outside air, the outer open ends of the said channels being arranged above the hollow chamber and the inner open ends of the same being disposed alternately in the top and bottom parts of the said hollow chamber, and a passage in the wall beginning in the top part of the hollow chamber and terminating higher than the said channels for establishing communication between the hollow chamber and the outside air.

In testimony whereof I hereunto affix my signature.

ING. LUDWIG MOTZKO.