

A. BUTZ.
ARRANGEMENT FOR THE DRAINAGE OF MOORS OF GREAT DEPTH.
APPLICATION FILED APR. 17, 1911.

1,032,186.

Patented July 9, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

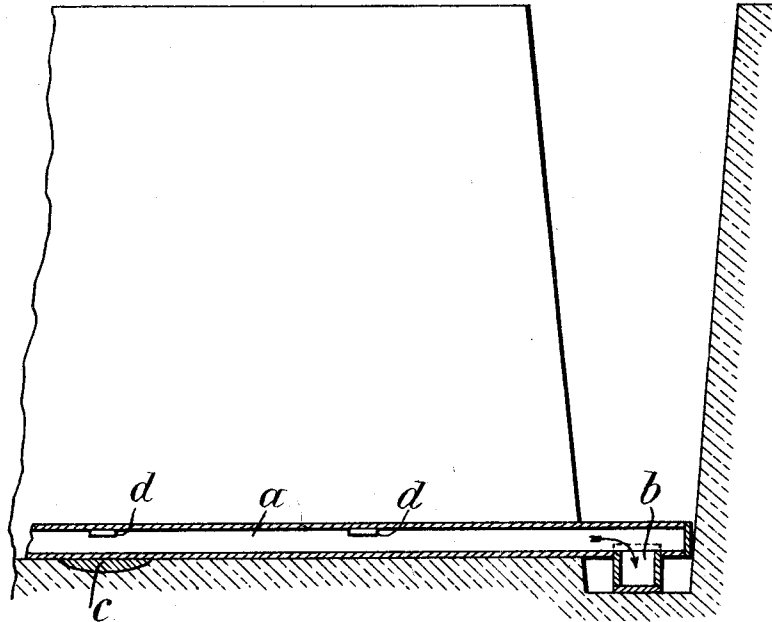


Fig. 2.

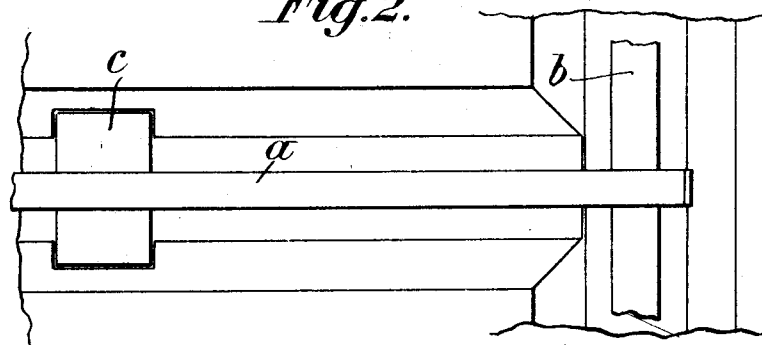


Fig. 3.

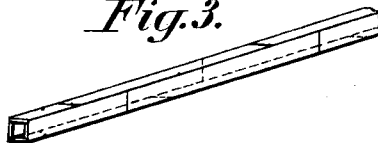
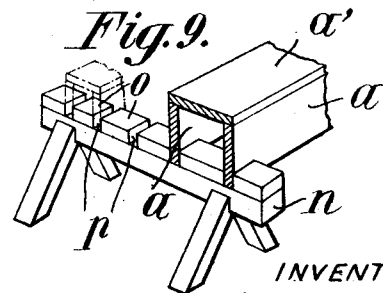


Fig. 9.



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 2 SHEETS—SHEET 2.

Fig. 4.

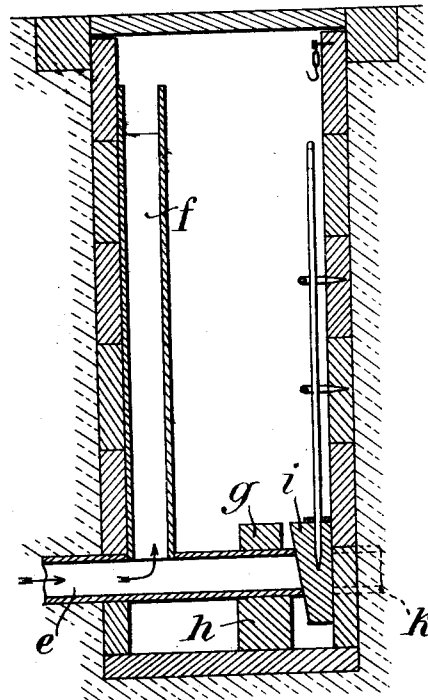


Fig. 6.

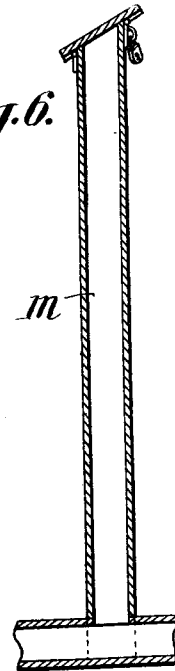


Fig. 5.

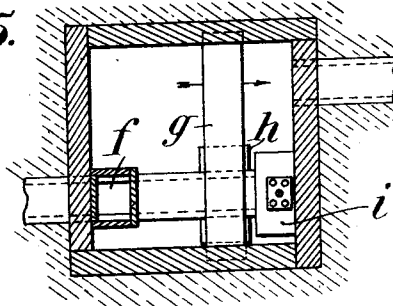


Fig. 7.

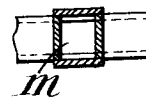
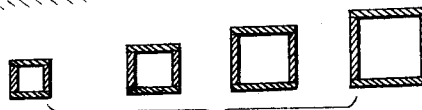


Fig. 8.



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UNITED STATES PATENT OFFICE.

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ARRANGEMENT FOR THE DRAINAGE OF MOORS OF GREAT DEPTH.

1,032,186.

—Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ANDREAS BUTZ, chief engineer, of Klagenfurt 5, Museumstrasse, Province of Carinthia, in the Empire of Austria-Hungary, have invented an Arrangement for the Drainage of Moors of Great Depth; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it ap-
10 pertains to make and use the same.

The present invention has for its main object to facilitate the drainage of deep bogs in such manner that large unbroken
15 tracts may be obtained. In doing this, economy of ground is effected by the use of open cuttings to the smallest possible extent, and also by the absence of many bridges or sluices. These again facilitate
20 the husbandry of the ground by allowing of the laying down of pasture upon the bog land without its being necessary to maintain too large a number of open ditches, and lessens the cost for laying down and main-
25 taining the drainage of deep bogs.

The drainage of deep bogs is effected by known methods, partly by open ditches, partly by a combination of such ditches with drains. The systems of drainage
30 hitherto employed for deep bogs are either (1) systems of clay drain pipes bedded with laths, rods, planks, or fagots; (2) wood drainage, with roots, fagots, rods or laths; (3) turf drains.

The employment of clay pipe drains on the bed which is indispensable in bog land, if the drainage is to be carried out carefully, is, on account of this bedding, very ex-
35 pensive in places where wages are high, and if the work be not conscientiously and carefully carried out, then perfect action becomes very doubtful, since the pipes change their positions and the ground water is not continuously carried off. Rod and lath
40 drains when carefully carried out are similarly costly, and moreover, when drains of these or of fagots or roots are used, the construction of drainage systems of great extent is set aside in favor of the greater
45 certainty of securing effective drainage, and the formation of considerable estates uninterrupted by ditches is made impossible. Moreover, the storage of the ground water, which is often necessary during drought in
50 regions with low rainfall, or in districts

with long spells of dry weather, is unavailable by all these methods of drainage.

The present invention is intended to combine the advantages of the clay pipe drainage in firm mineral soils viz., their regular, form and smooth profile with those of the
60 wood drains, viz., their pliability. It offers, that is to say, a regular, fixed, and smooth cross-section for carrying off the ground water taken up, so that even when little
65 fall is available, a large quantity of water may flow off rapidly, without great frictional resistance, and also, for the sake of easy connection with the main drain, large
70 systems of drainage may be set up, and therewith large surfaces of agricultural land, not interrupted by ditches, may be drained on bog land.

A further object is, that the sinkage of the drain-line which always occurs in bog
75 land after drainage may not imperil the successful drainage of the bog, but that up to a certain point the outflow of the ground water shall be assured.

In combination with a scheme of storage, the greatest possible part of the ground
80 water is to be quickly and effectually retained in case of need, and the height of the accumulated ground water is to be capable of observation through tube shafts at any
85 time. Moreover, the construction of the drain-line as a whole is to be effected outside the ditch, and thus the line is to be laid at one time in its whole length.

In the drawings wherein I have shown
90 one construction of the invention,—Figure 1 is a longitudinal vertical section illustrating one part of the system. Fig. 2 is a plan of Fig. 1. Fig. 3 is a perspective view of a construction of drain. Fig. 4 is a vertical
95 section of a storage reservoir constructed in accordance with the invention. Fig. 5 is a cross section of Fig. 4. Fig. 6 is a vertical section of an observation tube. Fig. 7 is a cross section of Fig. 6. Fig. 8
100 is a cross sectional view illustrating the various sizes of pipe, and Fig. 9 is a view of an apparatus used in constructing the pipes.

To obtain the advantages hereinbefore
105 enumerated, it is proposed to use wooden drains. To construct these wooden drains, boards, varying in dimensions, according as side drains or main drains are to be laid,
110 from 0.05 to 0.2 meters wide, 1, 1.2, 1.5, or

2 cm. thick, and usually 4 meters long, are so connected to form pipes closed all around, with a square or rectangular cross-section, in such a way that the two side walls of the pipes lie upon the board which forms the floor, or are secured to it. The board which closes the pipe above is secured to those which form the sides of the groove, Fig. 1. The cross-section may be of other form than that described.

The ground water enters, not as in clay pipe drainage through the seams of the joints, but through slots, sawed or cut at regular intervals, 0.5 to 1 cm. deep, and 5 to 10 cm. long, on the upper edges of the two side walls of the groove, or through other inlets *d*, Fig. 1, into the wood pipe *a*, then flows through the latter into the main channel *b*, the function of which is to carry off the water which it receives from the separate side drains. When little water enters, the openings for its entrance may be dispensed with, since in this case the butt joints of the boards will allow sufficient entrance for the water into the pipes. The junction of the side drains with the main drains is effected by connecting the two drains at the points of crossing by notching out, and otherwise securing them together.

After laying the wood pipes in the ditches dug for them, they have to be packed. If separate spots in the base of the ditch are very soft, the bottom of the pipe system is widened by underlaid sections *c* (Fig. 1) of board, at regular intervals, to distribute the pressure more suitably. To obtain an uninterrupted system of pipes, to render possible the construction of the whole system outside the ditches, and to avoid the meeting of all the four butt joints at the same point in the pipe from the equal length of the boards, the connection of the boards is so effected that the construction of a line is begun with four boards of unequal length, and thereafter carried on with boards of equal length (Fig. 3). In this way there is obtained an interrupted elastic line of wood pipes, such as insures the continuous carrying off of the ground water, in spite even of considerable and unequal sinkage of the ditch at separate points. The cross-sectional area of the pipes may vary as required. In order, however, that it may not be necessary to have the width of the boards different for every difference of sectional area, the boards which form the floor or cover of the troughs are to be used as side walls for the next greater sectional area so that for example in using four different calibers, only five different widths of boards need be used (Fig. 8). In order, however, to obtain a pipe line regular in profile throughout, there is used in constructing the same a template, by the use of which the maintenance of a predetermined cross-sectional area in the

pipe is assured. To the end in question, the best means is the appliance shown in Fig. 9, which is designed to keep the sides of the trough at equal distances while the top board is being nailed on. The apparatus consists of a trestle or frame *n*, on which are secured a number of logs of wood, and the width of which corresponds to several, *e. g.*, four different widths of pipe. The wood blocks are so arranged in series that a space *p* remains between them, which is somewhat larger than corresponds to the thickness of the boards used. After setting up several such blocks one behind the other, the boards which form the side walls of the pipe line are placed in two of the adjacent slits *p*, the distance apart of which corresponds to the desired cross-sectional area of the pipe line, after which the floor boards *a'* are nailed on. When a length of pipe has been formed as an open trough, it is laid reversed on the trestles, and the roof board thereafter nailed upon it. This completed section of the pipe is now turned into its original position, and allowed to hang down forward from the trestles. The formation of the three side walls is then continued as described until the whole pipe is completed as an open trough. Thereupon the pipe is laid upside down upon the ground, and the roof boards are nailed down after the inlet openings have been made.

At suitable points in the main drain storage apparatus (water tight reservoirs) Figs. 4 and 5, may be arranged, to enable the ground water to be rapidly stored for watering the soil. The pipe line interrupted by the reservoir may if required be actually cut off by the wooden wedge *i* (Figs. 4 and 5). In order to prevent the reservoir from being surrounded by water, the pipe line is not furnished with water inlets for about 10 m. above and below the storage arrangement, and is moreover calked with oakum, or the like. The ground water held back may, when it has reached a certain height, fall through an opening left by shortening the rising wall *F* onto the floor of the reservoir and flow off through the open pipe line *K*. Wooden shafts *m* (Figs. 6 and 7) may be arranged at certain distances behind the reservoir for observing the height of the ground water.

Since all experience up to the present shows that water in bog land is preserved for a remarkably long time (observations of over 40 years of lath drainage are available) this new process is in any case capable of facilitating the culture of bogs to an enormous extent, and to assist it, and this the more because the wood pipe system is available when the proportion of fall is very slight, and the excavation of drains is limited to what is necessary. Small variations in the level of the foot of the ditch

are without special unfavorable action, since the wood pipe line consists of an uninterrupted whole.

What I claim as my invention and desire to secure by Letters Patent is:

1. A drainage pipe line for deep bogs or the like, comprising a series of elements laid end to end, each composed of thin boards fastened together with an end of one board projecting beyond the end of another and forming a tubular body, whereby the butt-joints of said boards of adjacent elements alternate with each other and whereby the elements may be united by laying them end to end, the series constituting a pliant conduit capable of being extended to any desired length.

2. A drainage pipe line for deep bogs or the like, comprising a series of elements laid end to end, each composed of thin boards fastened together with an end of one board projecting beyond the end of another and forming a tubular body, whereby the butt-joints of said boards of adjacent elements alternate with each other and whereby the elements may be united by laying them end to end, the series constituting a pliant conduit capable of being extended to any desired length, the boards constituting the sides of said elements being provided with apertures for the entry of water.

3. A drainage pipe line for deep bogs or the like, comprising a series of elements laid end to end, each composed of thin boards fastened together with an end of one board projecting beyond the end of another and forming a tubular body, whereby the butt-joints of said boards of adjacent elements alternate with each other and whereby the

elements may be united by laying them end to end, the series constituting a pliant conduit capable of being extended to any desired length, the boards constituting the sides of said elements being provided at their upper sides with apertures for the entry of water.

4. A drainage pipe line for deep bogs or the like, comprising a series of elements laid end to end, each composed of four thin boards fastened together with an end of one board projecting beyond the end of another and forming a square tubular body, whereby the butt-joints of said boards of adjacent elements alternate with each other and whereby the elements may be united by laying them end to end, the series constituting a pliant conduit capable of being extended to any desired length, the two boards constituting the sides of said element being provided at their upper sides with apertures for the entry of water.

5. A system of draining deep bogs or the like comprising a series of flexible pipe lines made of wooden boards, said pipe lines having an angular cross section in combination with a main pipe or pipes extending angularly to said first-named pipes and beneath the same, and said named pipes having openings on their upper sides, and said first-named pipes having coinciding openings on their lower sides.

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

ANDREAS BUTZ.

Witnesses:

KARL REHAK,

AUGUST FUGGER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."