(No Model.) 2 Sheets—Sheet 1.

T. G. CHAPMAN.

WELL SINKING APPARATUS.

No. 405,199. Patented June 11, 1889.

Fig. 1.

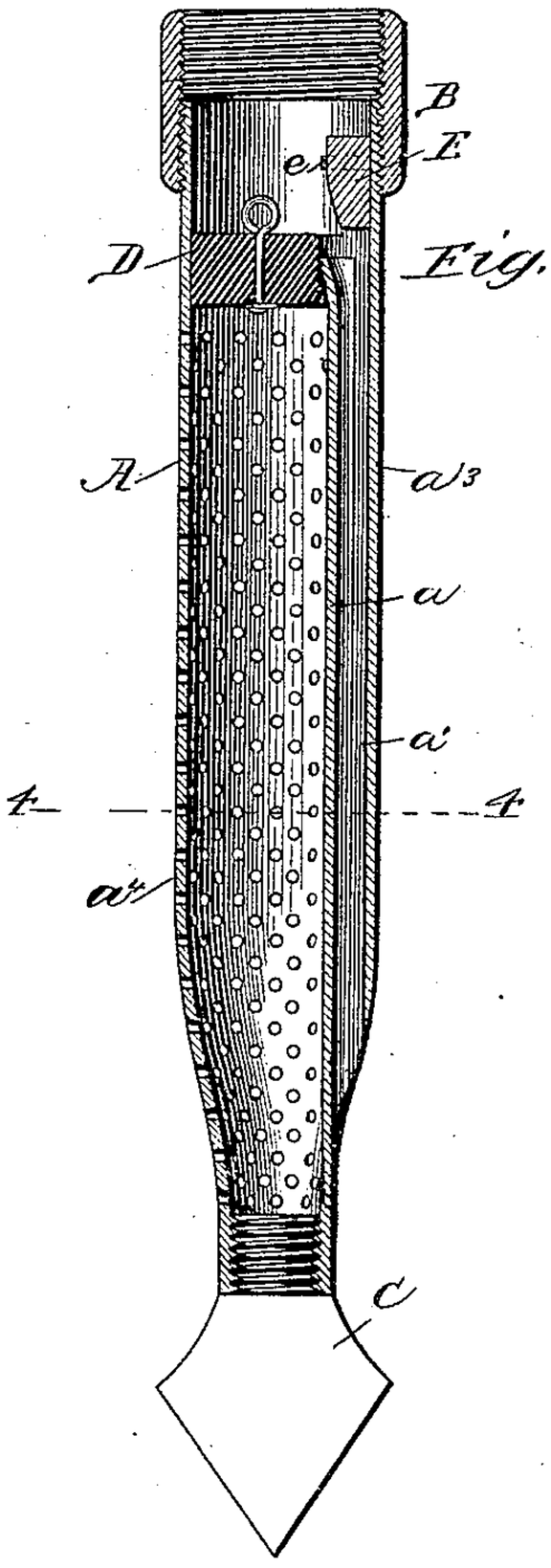


Fig. 2.

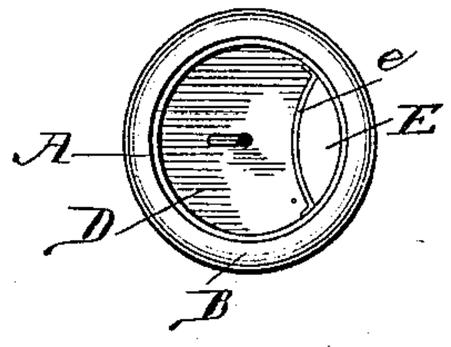


Fig. 3.

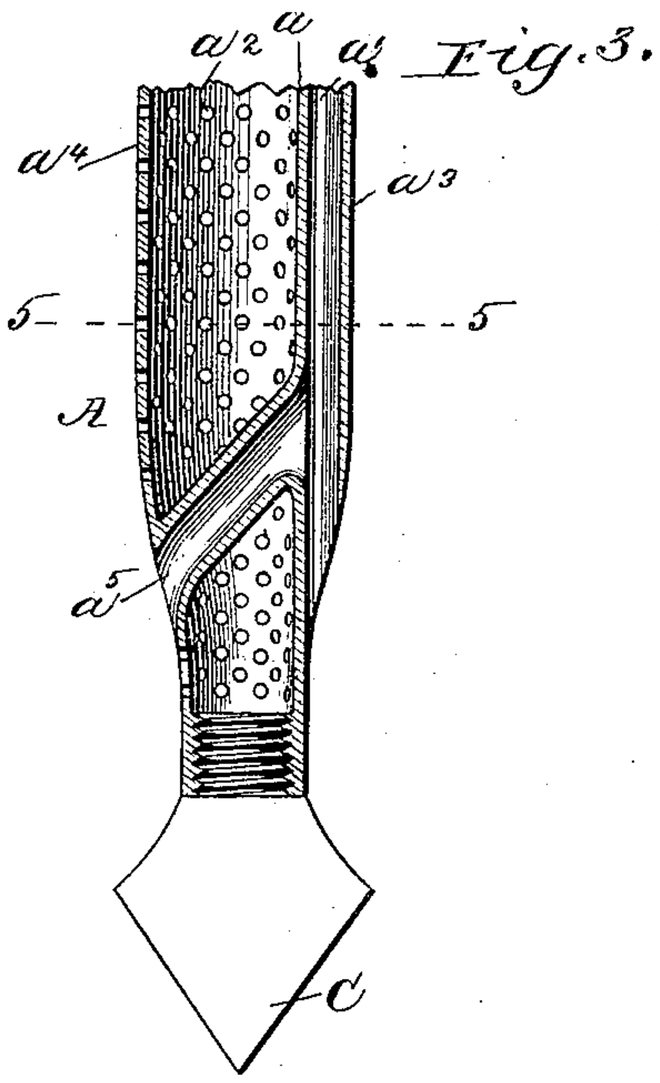


Fig. 4.

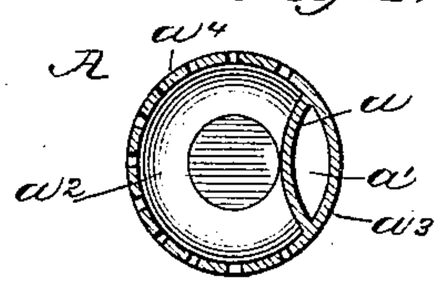
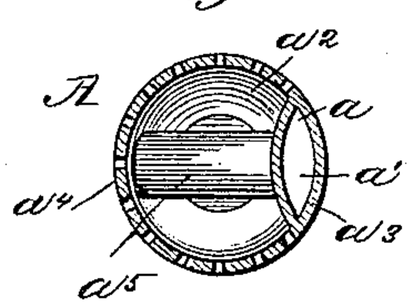


Fig. 5.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 6.

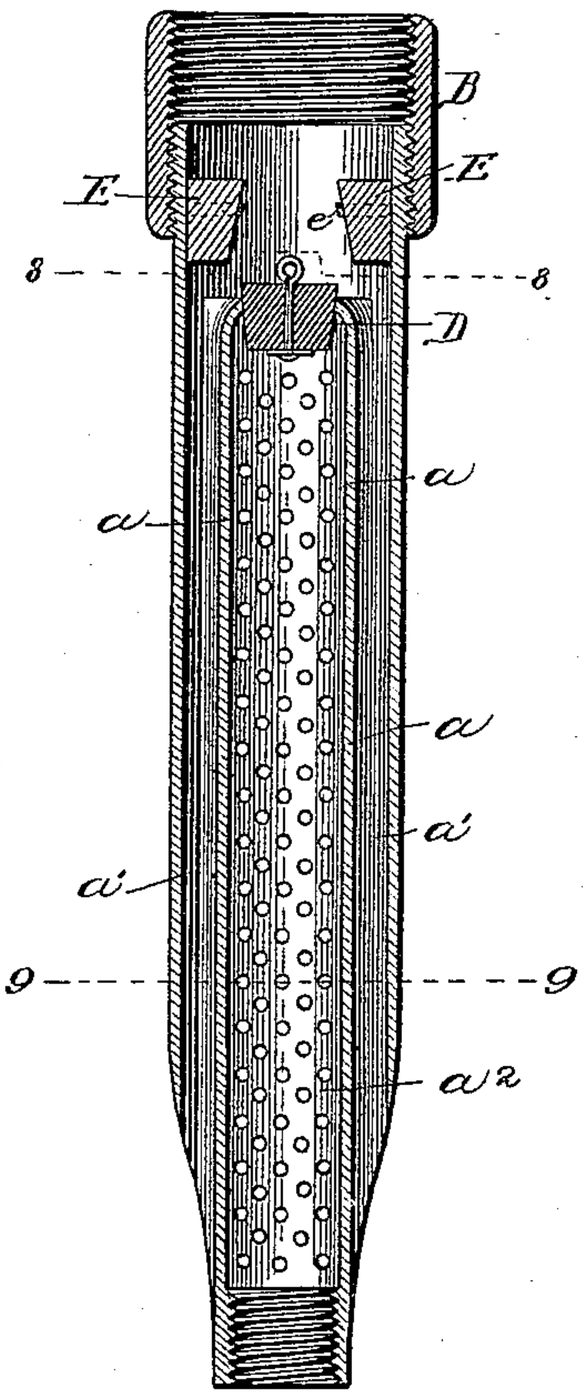


Fig. 7.

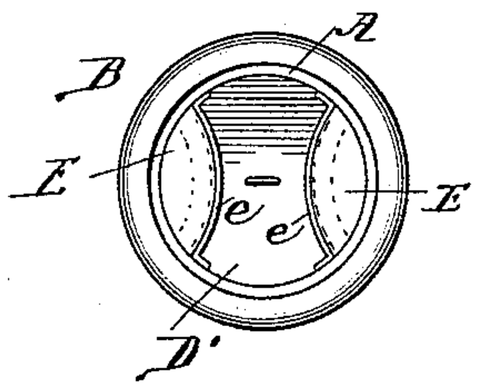


Fig. 8.

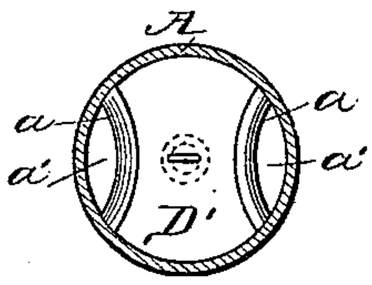
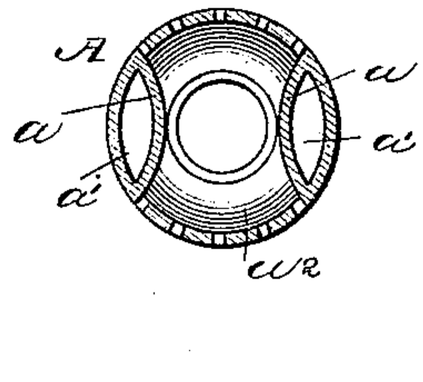


Fig. 9.



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UNITED STATES PATENT OFFICE.

THOMAS G. CHAPMAN, OF CHICAGO, ILLINOIS, ASSIGNOR TO FREDERICK C. AUSTIN, OF SAME PLACE.

WELL-SINKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 405,199, dated June 11, 1889.

Application filed April 9, 1888. Serial No. 270,119. (No model.)

To all whom it may concern:

Be it known that I, THOMAS G. CHAPMAN, a subject of the Queen of Great Britain, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Well-Sinking Apparatus, of which the following is a specification.

This invention relates to well-sinking apparatus in which the lowest section of the well-tubing that is to be sunk into the earth is provided with a strainer carrying a drilling-tool, and in connection therewith means employed for forcing a current of water down through the well-tubing and directing it to the drilling-tool, so that when the drilling-tool is operated by rotating the entire length of tubing above it the earth may be softened and loosened under and about the drilling-tool, and thereby permit the latter to work with greater ease and facility.

Certain objects of my invention are to provide an improved construction of strainer-tube, whereby during the well-sinking operation a passage formed through the strainer-tube for such upwardly-flowing current of well-water as it is desired may take place upon the completion of the well may be cut off from the passage through the well-tubing above it, and at the same time a separate passage is afforded for receiving a supply of water forced down the well-tubing and for conducting such supply of water to the drilling-tool; also, to provide simplified and improved means for discharging said supply of water relatively to the drilling-tool; to permit the employment of any desired construction of drilling-tool in connection with a strainer-tube comprising separate waterways; to permit the passage through which water may be directed to the drill during operation to be readily closed and the main strainer-passage for an upward flow of well-water to be readily opened as soon as the well-tubing has been sunk to the required depth; to permit the strainer-tube to be constructed with separate passages in a simple and economical way; to avoid the necessity for packings or washers, which must be torn out from the strainer-tube after the well-tubing has been sunk; to avoid the undesirable feature of a well-tube having water-ways formed by small tubes running along the outer side of the main tube and projecting out from the circumference of the cylindric tube to an extent to seriously interfere with the free rotation of the tube in sinking it into the earth, and in place of such objectionable construction to permanently divide the bore of the tube into passages which shall be within the radius of the cylindric exterior of the tube, and to provide certain improved details all serving to promote the serviceability of the apparatus and render it a commercial success.

To the attainment of the foregoing and other useful ends my invention consists in matters hereinafter described, and particularly pointed out in the claims.

In said drawings, Figure 1 represents a central longitudinal section through the strainer-tube divided longitudinally into two passages. Fig. 2 is a top plan view of Fig. 1. Fig. 3 represents the lower portion of the strainer-tube shown in Fig. 1, with the passage that is employed for conducting water to the drill provided with two outlets. Fig. 4 represents a section taken transversely through Fig. 1 on the line 4 4. Fig. 5 represents a section taken transversely through Fig. 1 on the line 5 5. Fig. 6 represents a central longitudinal section through the strainer-tube, having its bore or chamber divided longitudinally into several passages. Fig. 7 is a top plan view of Fig. 6. Fig. 8 represents a section taken transversely through Fig. 6 on the line 8 8. Fig. 9 is a like view taken through Fig. 6 on the line 9 9.

The tubular strainer A can be adapted to couple with a section or length of well-tubing in any suitable way, the representation of the internally-threaded sleeve B herein shown serving to illustrate an ordinary form of coupling for such purpose. The drilling tool or cutter C may likewise be of any desired construction and attached to the tubular strainer in any ordinary or convenient manner.

In the first five figures of the drawings the bore of the tubular strainer is permanently divided into two longitudinal passages by an internally-arranged web or partition *a*, which is present within the strainer as a fixture.

This said partition is arranged to one side of the axis or longitudinal center of the tube, so that while providing at one side of the partition a water way or passage a' of comparatively small sectional area, but of ample size for the flow of a suitable current of water to the drill-point, the water way or passage a^2 at the opposite side of the partition may be of comparatively large sectional area and of sufficient size for the flow of such upgoing current of fluid as may be admitted into the strainer after the well-tube has been sunk to the required depth. The partition a and the portion a^3 of the tube A, which affords, in conjunction with said partition, the walls of the passage a', are both imperforate, while, on the other hand, the remaining portion a^4 of the strainer-tube is perforated, in which way, while the passage a' will receive only at one end and discharge only at its other end, fluid may be admitted into the strainer-passage a^2 at various points along its length.

The strainer-tube is at its lower end preferably tapered or contracted, and the lower end of the passage a' is arranged to open at the point where such contraction in the diameter of the strainer-tube occurs. In this way the discharge end of said passage can be located directly over and within suitable proximity to the drilling tool or cutter. No enlargement of the general diameter of the strainer-tube is therefore rendered necessary in order to provide it with a passage arranged to conduct and properly direct a stream of water against the drill point or cutter, and hence no obstruction is offered to the easy rotation of the strainer-tube in boring. In this connection it will also be observed that the passage a' can throughout its length be made straight and parallel with the longitudinal center of the tube; also, that the strainer-tube can be cast with an internal longitudinal web, which serves to form the partition a, and hence an exceedingly simple, economical, and strong construction provided.

Ordinarily a single outlet for the passage a' (such as shown in Fig. 1) will be sufficient; but for work in certain soils an additional oppositely-arranged outlet may be desired. In such case this additional outlet can be provided by a small tubular branch a^5, arranged across the main passage a^2 of the strainer-tube, as in Fig. 3, and either cast with or at its ends secured, respectively, to the partition a and the strainer-tube by soldering or the like. The provision of this tubular branch serves to fork or divide the lower end portion of the passage a', so as to provide it with two oppositely-arranged outlets, both adapted to direct a current of water against the drill.

During the operation of sinking the well-tubing the passage a' is to be kept open, so that a supply of water under pressure can be conducted down through the tubing to the said passage. On the other hand, the chamber or main passage within the perforated portion of the strainer is to be cut off from the main length of well-tubing. To such end the passage a^2 can be temporarily closed at its upper end by a stopper D, to which a cord or wire may be attached, so that at a proper time the stopper can be drawn up through the well-tubing. As a simple and convenient arrangement for thus closing the passage a^2 the partition a may terminate short of the upper end of the tubular strainer, and the series of perforations in the strainer terminate somewhat below the level of the upper end of the said partition. The stopper D with such arrangement can be made segmental-shaped, substantially as in Fig. 2, so as to fit the passage a^2 at the point where it merges into the full bore of the tubing. The stopper can be made of any suitable elastic material, so that while it can be tightly fitted in place a proper pull upon the cord or wire will dislodge it from its seat.

In order to permit the passage a' to be closed after its service is no longer required, a stopper E can be temporarily held within the tube in such a way and in such relationship to the upper end of passage a that by means of a rod or a hammer let down into the tubing by a cord or wire the stopper E can be detached from its point of temporary securement and driven into the upper end of passage a. The stopper E can be attached to the tube by a light pin or by soldering, or a light strap e, of tin or any suitable metal or other substance, soldered to the tube, whereby its connection with the tube can be readily severed by a blow or blows from such instrument as may be let down into the tube for the purpose of driving the stopper securely into the upper end of passage a'.

During the operation of sinking the well-tubing the supply of water under pressure will pass down the well-tubing, but upon reaching the perforated strainer will by reason of the stopper D be prevented from entering such strainer, and hence be diverted into the passage a', and at the same time such fluid as may prematurely enter the strainer through its perforations will be prevented from flowing upwardly into the tubing and offering a counter resistance to the downwardly-flowing stream. As soon as the well-sinking operation has been completed the stopper E can be driven into the passage a', so as to close the same, and the stopper D can be drawn up through the well-tubing.

The arrangement of the partition a involves certain advantages, as hereinbefore set forth, whether it be integral with or formed separately from the strainer-tube and then secured therein, a further important advantage, however, being involved in making the web integral with the strainer-tube, as by casting it with the strainer-tube, which latter also serves as a stock or holder for the drill point or cutter.

In Figs. 6, 7, 8, and 9 the bore or chamber of the strainer-tube is divided by two webs

or partitions *a* into three longitudinal passages, in which way the passage *a'* within the strainer-tube of the preceding figures is duplicated, thereby providing the strainer-tube with a couple of passages *a'*, through which water under pressure may be conducted to points proper for directing the streams against the drill point or cutter, which in Fig. 6 is, for convenience of illustration, omitted. The strainer shell or tube in the last four figures is at opposite sides perforated along a suitable portion of its length, so as to permit the flow of the well-water into the central passages a^2 of the strainer after the well-tubing has been properly sunk.

The shape and application of the stopper D employed in said last four figures for closing the well-water passage a^2 of the strainer is illustrated in Figs. 6 and 7, it being understood that said stopper can be made of any suitable elastic material, and also that it can be withdrawn from the well-tubing in a manner similar to that in which the stopper D illustrated in certain other figures is to be removed. Where the bore of the strainer-tube is thus divided so as to arrange the strainer chamber or passage a^2 intermediate of the two passages *a'*, said last-mentioned passages can at a proper time be closed by plugs or stoppers E, similar in arrangement and application to the stopper E shown in Fig. 1. The partitions in the last four figures are rigid with and retained as fixtures within the strainer-tube, and, preferably, said webs or partitions *a* herein shown are made somewhat curved at their upper ends, so as to give the upper terminals of the passages *a'* a flare sufficient to insure their ready reception of stoppers E when the latter are dislodged from the inner wall of the strainer-tube.

In conclusion it may be observed that whether the bore of the strainer-tube is divided into one or more longitudinal passages the arrangement herein shown permits any desired form of drill point or cutter to be attached to the strainer-tube, and hence avoids an undesirable limitation to a hollow drilling-tool or hollow cutter. Thus the drill point or cutter can in the present connection be formed with any suitable arrangement of blade or blades formed with reference to durability and efficiency, and such drilling tool or cutter can be provided with a solid shank adapted to be coupled with the strainer-tube by any suitable mechanical coupling device, the arrangement of passage or passages *a'* within the strainer-tube serving to properly direct the downflowing stream or streams to the cutter regardless of the construction and mode of securement of the latter. It will also be observed that after the well-tubing has been sunk to the required depth the stopper D will be the only matter that is to be withdrawn from the strainer-tube. While, therefore, my improvement avoids a limitation of the drilling-tool employed to a hollow drill, and further avoids leaving the main strainer-passage open at its lower end, as in devices heretofore proposed, where the bore of the strainer-tube is prolonged by the bore of a hollow drilling-tool, it is herein understood that without further experiment the lower end of passage *a* or of a branch leading from such passage could be diverted, so as to discharge into the bore of a hollow drilling-tool in case it should be desired to employ such construction, since in such case the bore of the hollow drill could be closed to the strainer-passage a^2, but left open to the supply-passage *a'*, it being seen that the arrangement of said passage *a'* will prevent water from entering the strainer-passage through the drill and compel the well-water or other fluid to properly enter the strainer through its perforations, and further that the well-water cannot flow up the passage *a'* into the well-tubing, since said passage *a'* will be sealed by its allotted stopper. It is also herein understood that by dividing the bore of the strainer-tube by one or more longitudinally-arranged partitions one or more strainer-passages can be provided for the upflowing well-water in addition to the provision of one or more passages for conducting water to the drilling-tool during the operation of forcing it into the earth.

In conclusion it may be stated that in my application for Letters Patent of the United States No. 270,120, filed on or about April 9, 1888, I have shown a cylindric strainer-tube provided at its lower end with a bit and having its cylindric bore permanently divided into separate passages by a small tube, which is arranged within said bore of the strainer-tube and united thereto in a manner to open through the side of the strainer-tube at a point where the contracted lower end portion of the tube occurs, and while therefore said arrangement involves a principle herein embodied, I have made in said application, No. 270,120, special claim to the provision and arrangement of the inner small tube in contradistinction to a web or partition extending longitudinally within the bore of the strainer-tube and dividing the same into separate passages.

What I claim as my invention is—

1. In a well-boring device, the strainer-tube having its bore permanently divided into a couple of passages which are within the circumference of the cylindric tube, one of said passages being adapted to direct a downflowing stream of water to a drilling-tool and the other being adapted to constitute the main strainer-passage for an upflowing current of well-water, substantially as set forth.

2. In a well-boring device, the strainer-tube having its bore permanently divided into a plurality of passages which are within the circumference of the cylindric tube, one or more of said passages being adapted to constitute the main strainer passage or passages for an upflowing current or currents of well-water,

and the other passage or passages being adapted to direct a downflowing current or currents of water to a drilling-tool, substantially as set forth.

3. The combination, substantially as hereinbefore set forth, with a suitable drilling-tool, of the strainer-tube having its bore divided longitudinally by a web or partition, so as to provide the passage through which water is supplied to the drill and the main strainer-passage for the well-water.

4. The combination, substantially as hereinbefore set forth, with a suitable drilling-tool, of the strainer-tube contracted at its lower end and having its bore divided longitudinally to provide a main strainer-passage for the well-water and a passage a', through which water may be supplied to the drill.

5. The combination, substantially as hereinbefore set forth, with the strainer-tube having its bore divided longitudinally into a strainer-passage for the well-water and one or more passages through which water can be supplied to the drill, said passages being arranged within the circumference of the cylindric tube, of a stopper adapted to temporarily close the main strainer-passage, for the purpose set forth.

6. The combination, substantially as hereinbefore set forth, with the strainer-tube containing within its cylindric bore a main strainer-passage for the well-water and one or more passages for conducting water to the drill, of one or more stoppers detachably held in place above the upper entrances to the passage or passages through which water is to be conducted to the drill, for the purpose described.

7. The combination, substantially as hereinbefore set forth, with the strainer-tube containing within its cylindric bore two or more passages, for the purpose described, of the stoppers D and E, adapted for application, substantially as and for the purpose set forth.

8. The combination, substantially as hereinbefore set forth, with a suitable drill, of the strainer-tube containing the main strainer-passage for the well-water and a separate passage adapted for conducting water to the drill and having its discharge end portion divided to provide it with separate outlets, for the purpose described.

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L. L. PAGE.