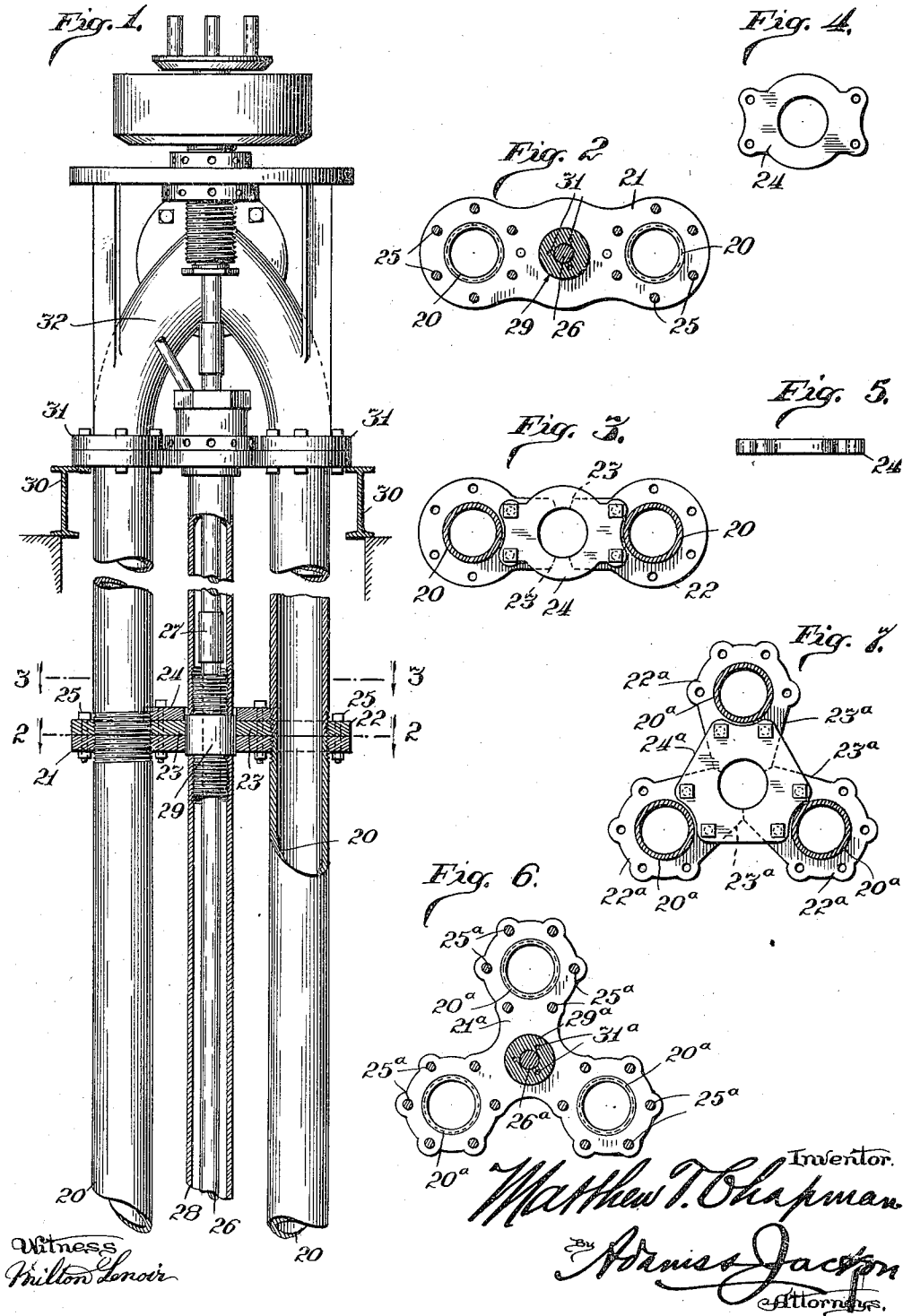


M. T. CHAPMAN.
DEEP WELL CENTRIFUGAL TURBINE PUMP.
APPLICATION FILED JAN. 8, 1918.

1,320,735.

Patented Nov. 4, 1919.



UNITED STATES PATENT OFFICE.

MATTHEW T. CHAPMAN, OF AURORA, ILLINOIS, ASSIGNOR TO THE AMERICAN WELL WORKS, OF AURORA, ILLINOIS, A CORPORATION OF ILLINOIS.

DEEP-WELL CENTRIFUGAL TURBINE-PUMP.

1,320,735.

Specification of Letters Patent.

Patented Nov. 4, 1919.

Original application filed October 6, 1916. Serial No. 124,141. Patent No. 1,266,552, dated May 21, 1918.
Divided and this application filed January 8, 1918. Serial No. 210,853.

To all whom it may concern:

Be it known that I, MATTHEW T. CHAPMAN, a citizen of the United States, and a resident of Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Deep-Well Centrifugal Turbine-Pumps, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to that type of deep-well pumps wherein are employed suitably-incased centrifugal water-raising elements that are intended to be normally located below the level of the water in the well. In pumping apparatus of this character it is deemed of advantage to provide a plurality of discharge pipes connected at their lower ends with the casing that incloses the centrifugal pump members, through which pipes the water is forced to and through a single outlet member at the surface. In the ordinary practice of installing apparatus of this general type it has been customary to send from the factory the various pipe sections, and the parts designed to unite them, in a wholly unassembled condition—the work of properly assembling and coupling them together being done at the well. Inasmuch as the labor available for such work is frequently unskilled and inexperienced in such matters it often follows that the assembling is so poorly done as to render the apparatus as a whole unsatisfactory. When it is borne in mind that the rotary shaft for driving the pumps must be fixed and at all times maintained in an absolutely vertical position and that the lateral support relied upon to maintain such shaft in its vertical position is derived from the discharge pipes, it will be very plain that the proper placing and securing together of the various sections that constitute each of the discharge pipes is exceedingly important. It is the object of my invention to overcome the objections that are incident to constructing a discharge apparatus in the manner referred to, and briefly stated, I accomplish it by constructing the plural discharge elements in units, each of which comprises the required number of parallel pipe sections immovably united at each end by connecting devices of a character hereinafter specifically described, the ends of each unit being machined so as to present true

surfaces parallel with each other to adapt the various units being secured together end to end to form a perfectly straight complete set of discharge pipes. Furthermore, it is my object to have the connecting devices that join the pipe sections of each unit together properly and carefully bored so that the openings therethrough are in perfect alinement, and as the sectional casing in which rotates the pump-shaft (and which provides lubricant to the shaft) passes through these alined openings it is evident that the shaft and its inclosing casing will be insured being placed and maintained in the required vertical position, the coupling members for the said casing having a sliding fit in the said alined openings. By uniting the end portions of each set of pipes, and machining the ends of each discharge unit true and parallel, as stated, and also machining said openings through the pipe-uniting members, I am able to ship in assembled condition the various units that, when placed end to end, form the main portion of the discharge pipe system of a well and also form the lateral supporting means from which the pump-shaft and its casings are held vertical—which units are capable of being installed in a well properly and with comparative ease and rapidity, even by unskilled labor.

That which I believe to be new will be pointed out in the claims.

In the drawings:

Figure 1 is a view partly in elevation and partly in vertical section, of the upper portion of a pumping apparatus to which is connected water discharge pipes, the several units of which are secured together by my improved means, two of the pipes embraced in one of such units being partially broken away;

Fig. 2 is a section at line 2—2 of Fig. 1, and showing a top view of the plate at the upper end of each discharge-pipe unit, into which plate the pipe members are secured, and the central opening in which plate forms a portion of the bearing in which one of the shaft-casing couplings fits;

Fig. 3 is a top or plan view of the flanges that are connected, respectively, to the lower ends of the pipes of each discharge-pipe unit, showing also the connecting plate that is bolted to said flanges, the said pipes being

shown in section,—the view being in effect a cross-section taken at line 3—3 of Fig. 1, but with the shaft and its casing omitted;

Figs. 4 and 5 are plan and edge views, respectively, of the connecting plate shown in Fig. 3;

Figs. 6 and 7 are views corresponding to Figs. 2 and 3, respectively, but with the parts shaped to adapt them for use with a three-pipe unit.

Referring to the several figures of the drawings,

20 indicates water discharge pipes, each made up of a series of sections, and each line of pipe sections extending from the discharge-head at the top of the well to the casing that is located down in the well below the surface of the water being pumped, such pipes being connected to said discharge-head and casing as hereinafter described. The pipes are spaced a distance apart and held by means of connecting devices at the upper and lower ends of the sections. Each two sections of pipe are connected together by means of a single plate 21 having openings therethrough near its opposite ends into which the said upper ends of the pipe sections are screwed. Upon the lower ends of each two pipe sections are screwed flanges 22. As best shown in Fig. 3, each of these two flanges is provided with a lateral wing 23, and when the flanges are screwed upon the pipe sections they are to be so turned that the two wings 23 carried by the flanges, respectively, will be directed toward each other. At this flanged end, the pipe sections are rigidly connected together by a plate 24 resting upon the flanges 22 and wings 23 and bolted to said flanges. With two pipe sections thus connected together at their upper and lower ends, it is evident that the structure thus formed is a very rigid one as no independent movement of any of its parts is possible. In this rigid united condition the structure is then subjected to machining operations at its end portions so as to make the end surfaces perfectly true and parallel with each other and the connecting devices comprising the single connecting plate 21. The winged flanges 22 and plate 24 are subjected to such further machining operations as will insure a central passage therethrough and a sliding fit therein of a pump-shaft casing so that such casing shall when passed through such openings extend vertically and in parallelism with the said pipe sections. The central alined openings for the passage of this shaft casing are of larger diameter than the shaft casing proper, whereby the enlarged central cylindrical portions of the couplings that unite the sections of the shaft casing shall accurately and slidingly fit therein. After being machined in the manner briefly referred to, each pair of pipe sections and

the parts that rigidly connect their ends together are ready for shipment to the place of use, and when used in the construction of a pumping apparatus will be bolted to other similarly formed structures without having any of its parts disconnected or changed from the condition in which it left the place of manufacture. These various pump units are very readily and comparatively easily connected together as there is no screwing together of the various pipe sections, but all that is required to be done is to bolt the various units together. In so uniting them, they will be placed so that the under surfaces of the flanges 22 of one unit bear against the upper surface of the single plate 21 of another unit and then the connecting bolts 25 are inserted through said flanges and plate, as therein indicated, and then the nuts on the bolts are to be tightened. In view of the machining of these abutting surfaces in the manner described, it is evident that the ends of the units will properly fit one against the other so that the pipes 20 as a whole will extend from the top to the bottom of the well in almost perfect parallelism, and consequently insure perfectly alined openings through the pipe connecting means, which insures also that the shaft and its inclosing casing will be inserted and maintained in place in parallelism with the discharge pipes. The pump-shaft is indicated by 26; as is usual it is made up of sections secured together by couplings 27. 28 indicates the before mentioned inclosing casing for the shaft 26, which is also made up, of course, in sections. These casing sections are connected together by a coupling 29, each coupling comprising two screw-threaded end portions upon which the ends of the adjoining casing sections 28 are screwed and a cylindrical portion intermediate of the screw-threaded end portions, which intermediate portion is of materially larger diameter than the end portions. The casing sections are to be of such a length as to insure the enlarged cylindrical central portion of each coupling to lie within the opening formed through the abutting end connecting members of two of the said units, and as the central portion of the coupling has been machined to have a sliding fit within such opening, it is evident that the bearing thus formed between the parts insures the proper vertical position of the casing and its contained shaft.

30 indicates I-beams secured in position at opposite sides of the well mouth, and upon which is suitably secured the plate 21 of the uppermost pipe unit. Against the machined upper face of this connecting plate 21 rest flanges 31 formed on the base of the discharge-head—such flanges being also formed true on their under surfaces to make a perfect fit with the plate 21. The plate

21 and flanges 31 of the discharge-head are bolted together as shown, and it will be understood that the upper end of the casing (not shown) at the lower end of the pipe

5 sections will be secured in a similar manner to the lower end of the lowermost unit. The discharge pipes communicate with and discharge into a Y-shaped connection 32 that in turn discharges into a large discharge
10 pipe bolted thereto. The details of the discharge-head and parts carried thereby or connected therewith are not here illustrated or described, as such matters, while originally forming a part of this application,
15 have, pursuant to a requirement of the Patent Office, been divided out and form, in part, the subject-matter of my application, Serial No. 274,526, filed February 1, 1919.

It is evident, of course, that in lieu of
20 the two-pipe construction for each unit that has been described so far, a larger number of pipe sections to each unit might be employed, and in Figs. 6 and 7 I have illustrated a three-pipe structure. Referring to
25 said figures, the three pipes there shown are indicated by 20^a and the single plate that connects such pipes together at one end and that correspond to the single plate 21 is indicated by 21^a. The flanges at the other
30 end of the pipe sections, which correspond to the flanges 22 in the construction already described, are indicated by 22^a, their laterally extending wings by 23^a and the plate that lies over and is attached to the parts
35 22^a and 23^a is indicated by 24^a. The other parts in said figures corresponding to the parts already described are indicated by the same reference numerals with the addition of the letter "a."

40 In a broad sense my invention relating to the construction of the pipe units machined and assembled so as to be in proper position for use just as they leave the factory is set forth in Letters Patent No. 1,266,552,
45 dated May 21, 1918, granted upon my application, Serial No. 124,141, filed Oct. 6, 1916, and to that extent is a division of such application.

My invention has been illustrated and described in connection with a deep-well
50 pumping apparatus containing various novel features of construction that were originally claimed herein but which, pursuant to a requirement of the Patent Office, have been
55 made the subject of a separate application for patent, which was filed February 1, 1919, and is Serial No. 274,526.

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

60 1. In a deep-well centrifugal pump, the combination of a plurality of discharge pipes of approximately uniform length, a plate having a plurality of screw-threaded openings into which said pipes are screwed at
65 their ends, and separate flanges secured by

means of screw-threads upon the opposite ends of said pipes, said pipes and flanges being machined to uniform length after being secured to said plate.

2. In a deep-well centrifugal pump, the
70 combination of a plurality of discharge pipes of approximately uniform length, a plate having a plurality of screw-threaded openings into which said pipes are screwed at their ends, and separate flanges secured
75 by means of screw-threads upon the opposite ends of said pipes, said pipes and flanges being machined centrally to uniform length for forming one section of discharge pipes.

3. In a supporting means for a deep-well
80 rotary pump, the combination of a plurality of sections secured together, each section comprising a plurality of parallel pipes, a common plate at one end into which said pipes are screwed, and separate flanges at
85 the other end.

4. In a deep-well centrifugal pump, the combination of a series of water-discharge units arranged end to end, each unit comprising a plurality of pipes arranged side
90 by side and spaced a distance apart, each of which pipes is provided at one end with a flange and with means rigidly connecting said flanges together, and means rigidly connecting the pipes together at their other ends.
95

5. In a deep-well centrifugal pump, the combination of a series of water-discharge units arranged end to end, each unit comprising a plurality of pipes arranged side
100 by side and spaced a distance apart, each of which pipes is provided at one end with a flange screw-threaded thereon and a plate rigidly connecting said flanges together, and means rigidly connecting the pipes together at their other ends.
105

6. In a deep-well centrifugal pump, the combination of a series of water discharge units arranged end to end, each unit comprising a plurality of pipes arranged side
110 by side and spaced a distance apart, each of which pipes is provided at one end with a flange screw-threaded thereon and a plate rigidly connecting said flanges together, and a single plate into which the opposite ends of the pipes are secured for rigidly connecting
115 said last named ends together.

7. In a deep-well centrifugal pump, the combination of a series of water-discharge units arranged end to end, each unit comprising a plurality of pipes arranged side
120 by side and spaced a distance apart, each of which pipes is provided at one end with a flange screw-threaded thereon and a plate rigidly connecting said flanges together, and a single plate into which the opposite ends
125 of the pipes are secured for rigidly connecting said last-named ends together, said unit having its ends parallel with each other.

8. In a deep-well centrifugal pump, the combination of a series of water-discharge
130

units, each unit comprising a plurality of pipes parallel with each other and spaced a distance apart and connected together at one end by a plate into which said pipes are
 5 screw-threaded and connected together at the other end through flanges that are applied to the pipes and rigidly united by a plate, said units being bolted together end to end with the first-described end of one
 10 unit arranged against the second-described end of the next succeeding unit.

9. In a deep-well centrifugal pump, the combination of a series of water-discharge units arranged end to end, each unit comprising a plurality of pipes parallel with
 15 each other and spaced a distance apart, each of which pipes is provided at one end with a flange and with means rigidly connecting said flanges, and means for rigidly connecting
 20 the other ends of the pipes together, said means for connecting the pipe ends together having alined openings therethrough for the passage of another pipe.

10. In a deep-well centrifugal pump, the combination of a series of water-discharge units arranged end to end, each unit comprising a plurality of pipes parallel with
 25 each other and spaced a distance apart, each of which pipes is provided at one end with a flange and with a plate rigidly uniting said flanges, and a plate into which the other ends of the pipes are screwed, said two
 30 plates having alined openings therethrough to receive another pipe.

35 11. In a deep-well centrifugal pump, the combination of a series of water-discharge units arranged end to end, each unit comprising a plurality of pipes located side by side and spaced a distance apart and connected
 40 together at opposite end portions of the unit, such connecting devices including a flange screwed upon one end of each pipe, each flange being recessed to partially embrace another pipe located between the first-
 45 named pipes.

12. In a deep-well centrifugal pump, the combination of a series of water-discharge units arranged end to end, each unit comprising a plurality of pipes located side by
 50 side and spaced a distance apart and connected together at opposite end portions of the unit, such connecting devices at one of said end portions including flanges screwed upon the pipes and a plate rigidly connecting
 55 said flanges together, said plate having an opening therethrough for the passage of another pipe and the flanges being recessed to partially embrace said last-named plate.

60 13. In a deep-well centrifugal pump, the combination of a series of water-discharge units arranged end to end, each unit comprising a plurality of pipes located side by

side and spaced a distance apart and connected together at opposite end portions of
 65 the unit, such connecting devices at one of said end portions including flanges screwed upon the pipes and having lateral wings projecting therefrom in the edges of which wings are recesses to receive another pipe
 70 located between said first-named pipes.

14. In a deep-well centrifugal pump, the combination of a series of water-discharge units arranged end to end, each unit comprising a plurality of pipes located side by
 75 side and spaced a distance apart and connected together at opposite end portions of the unit, such connecting devices at one of said end portions including flanges having laterally-extending wings each with a recess
 80 in its edge, said flanges being screwed upon the pipes to bring said recesses in position to cooperate in receiving and holding another pipe located between the first-
 85 named pipes.

15. In a deep-well centrifugal pump, the combination of a series of water-discharge units arranged end to end, each unit comprising a plurality of pipes located side by
 90 side and spaced a distance apart and connected together at opposite end portions of the unit, such connecting devices at one of said end portions including flanges having laterally-extending wings each with a recess
 95 in its edge, said flanges being screwed upon the pipes to bring said recesses in position to cooperate in receiving and holding another pipe located between the first-
 100 named pipes, and a plate rigidly connecting said flanges together and provided with an opening for the passage of the pipe that is engaged by the recesses of said wings.

16. In a deep-well centrifugal pump, a water-discharge unit comprising an end plate, a plurality of pipes spaced a distance
 105 apart and screwed at one end into openings in said plate, a flange on the opposite end of each pipe, and means rigidly securing said flanges together to prevent relative movement of any part of the unit, the ends
 110 of said unit being parallel with each other.

17. In a deep-well centrifugal pump, a water-discharge unit comprising in combination an end plate, a plurality of pipes spaced a distance apart and screwed at one
 115 end into openings in said plate, a flange on the opposite end of each pipe, and a plate extending between and rigidly securing said flanges together to prevent relative movement of any part of the unit, the ends of
 120 said unit being parallel with each other, and the securing means at the opposite end portions of the unit being provided with alined openings to permit the passage therethrough of another pipe.

MATTHEW T. CHAPMAN.