(No Model.) 2 Sheets—Sheet 1.

E. L. DAVIES & J. N. WHITE.

WINDMILL.

No. 504,301. Patented Aug. 29, 1893.

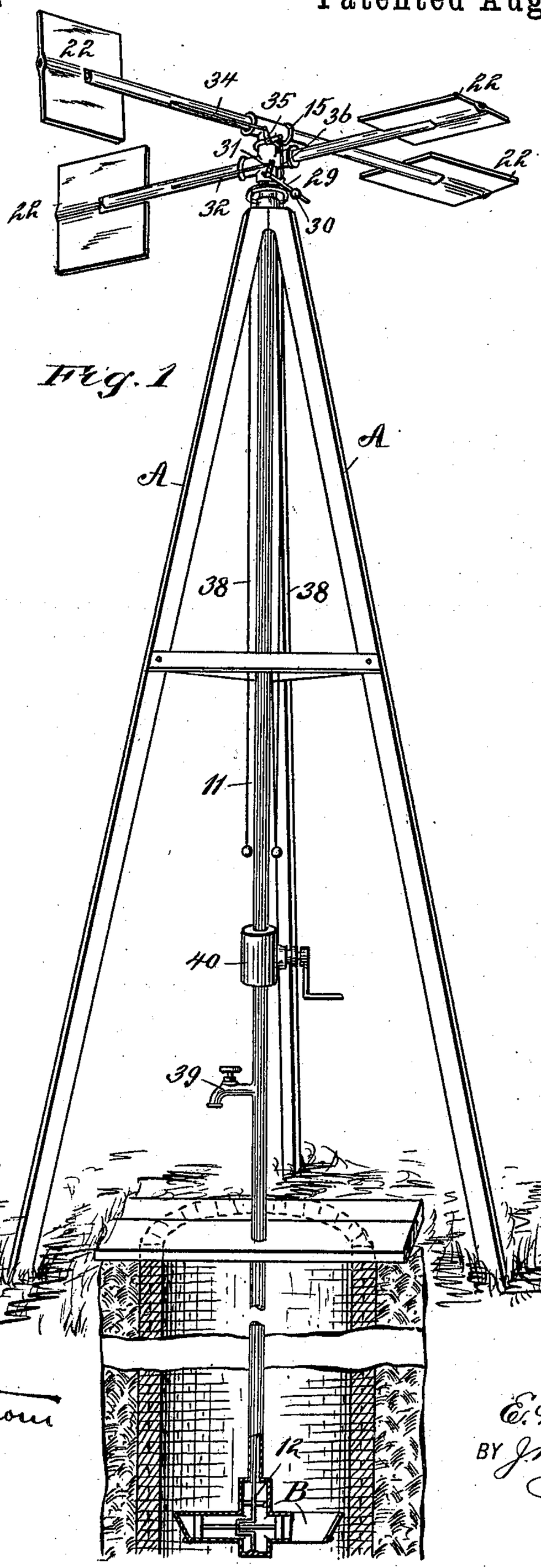

Fig. 1

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Fig. 2.

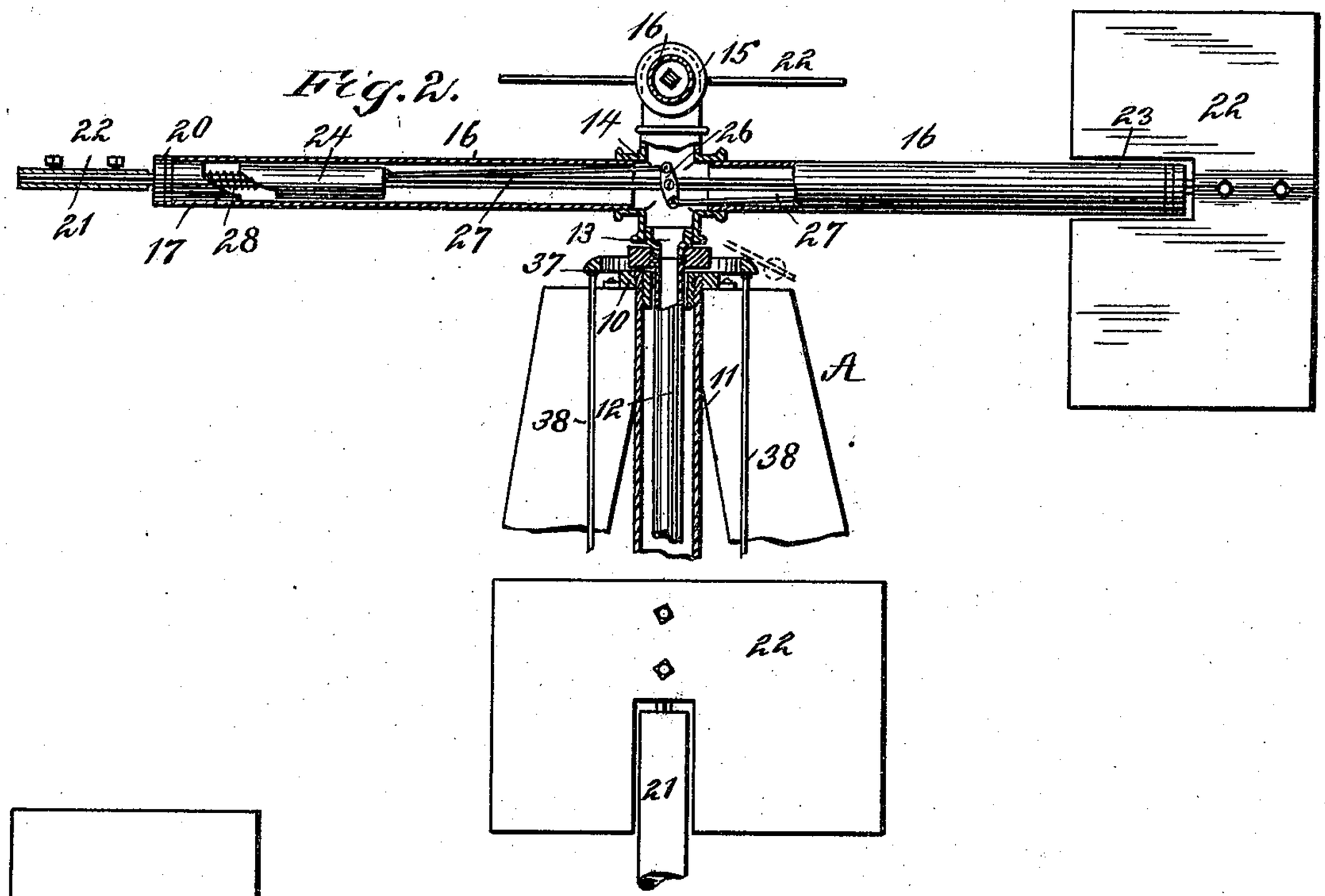

Fig. 3.

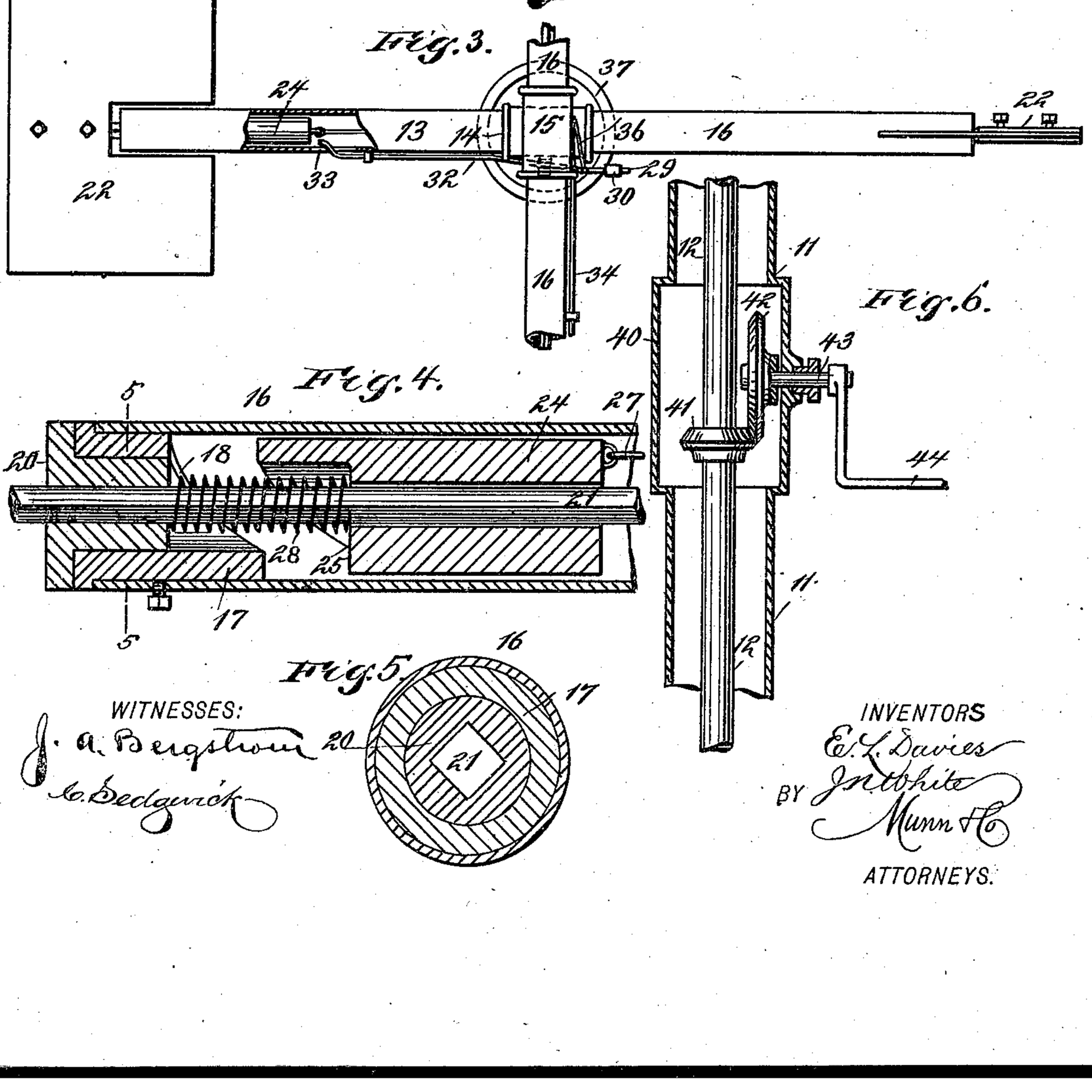

Fig. 6.

Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

EDWIN L. DAVIES AND JOHN N. WHITE, OF SALT LAKE CITY, UTAH TERRITORY.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 504,301, dated August 29, 1893.

Application filed November 12, 1892. Serial No. 451,761. (No model.)

To all whom it may concern:

Be it known that we, EDWIN L. DAVIES and JOHN N. WHITE, of Salt Lake City, in the county of Salt Lake and Territory of Utah, have invented a new and Improved Windmill, of which the following is a full, clear, and exact description.

Our invention relates to an improvement in wind mills, and has for its object to construct a wind mill in an exceedingly simple manner, but to render the mill durable, and further to so construct the mill that a maximum of power may be obtained from it, and whereby the mill will be always in the wind.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth and pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a perspective view of the wind mill, showing its connection with a pump the latter being in section. Fig. 2 is a horizontal section through a portion of one of the arms, and a partial vertical section through the stand pipe and shaft. Fig. 3 is a plan view of one of the arms of a set and the vanes carried thereby, a portion of the arm being in section. Fig. 4 is a partial longitudinal section through one of the arms. Fig. 5 is a transverse section through an arm, taken practically on the line 5—5 of Fig. 4; and Fig. 6 is a vertical section through one portion of the stand pipe, illustrating a means for turning the shaft when there is no wind.

The tower A may be of any approved construction, and at the top the tower is provided with an attached wear plate 10. The stand pipe 11, is secured in the wear plate, which is apertured to receive it, and the stand pipe extends downward to the pump B, as shown in Fig. 1. The driving shaft 12, which is located within the stand pipe, is hollow throughout its entire length, except at that point where it enters or joins the pump; and by thus making the shaft hollow except at its lower end, the shaft is not only rendered light, but it has considerable buoyancy, and does not tend to bear heavily upon the main bearing of the mill. The upper end of the shaft is connected with a four-armed fitting 14, through the medium of a reducer 13. The said fitting may be termed a hub, and is somewhat of a cruciform pattern, while a second and somewhat similar hub 15, is secured to the upper arm of the lower hub, one hub standing at an angle to the other. Both of these hubs turn together, and when they are revolved the shaft 12 is revolved also. The connections for each of the hubs are the same; therefore the connections for the lower hub only will be described. The hubs may have as many arms as desired and any number may be used. The hubs are hollow, and in each side arm thereof a tube 16, is screwed, or otherwise secured, or the hub and arms may be virtually integral. At the outer end of each of these tubes a sleeve 17, is securely fastened, and the inner surface of each of the sleeves is made spiral, as shown at 18 in Fig. 4 and likewise in Fig. 2. Any approved means may be employed for securing the sleeves to the tubes; usually a set screw is used.

Within each sleeve a bushing 20 is fitted, and in the bushings the ends of a shaft 21 are fitted, the shaft being polygonal in cross section, usually rectangular. The shaft 21 extends from the end of one tube to the end of the opposite tube of the hub, and through and beyond the ends, and upon the extremities of the shaft 21 the vanes 22 are secured. The vanes are so placed that one will be perpendicularly located and the other horizontally; that is to say, the vanes at one side of the hub will face in a reverse direction to the vanes at the opposite side.

The vanes are usually provided with recesses 23 in their inner edges, which receive the tubes, so that the vanes can be carried as far inward over the tubes as in practice may be found desirable. Thus there may be no limit practically to the width of the vanes, and yet the vanes need not extend a very great distance beyond the ends of the tubes. The lower portions of the vanes are the longest; that is to say, the distance from the center of a vane to its lower edge is greater than the distance from its center to its upper edge; thus, as the lower portion of a vane presents

more surface to the wind than the upper part the vane will be much easier turned, and there will not be much wear and tear of the shifting mechanism of the vane. The vanes are equally balanced, but the difference in width at the upper and lower sides of their fulcrums is in the ratio of about two to one.

The mechanism employed for shifting the vanes consists of two sliding or shifting blocks 24, and these blocks are mounted one near each end of the shaft 21 opposite the spiral face of the fixed sleeves 17; and the outer ends of the shifting or sliding blocks are provided with spiral surfaces 25, adapted to neatly fit the corresponding faces of the sleeves, and when the blocks and the sleeves are brought together the vanes will be given a quarter turn so as to present their edges to the wind, and the closer the sliding blocks approach the fixed sleeves the more inclination will be given to the vanes and the less surface will they present to the wind.

The sliding or shifting blocks are operated automatically by centrifugal force, and they operate simultaneously also. The simultaneous operation is effected by pivoting within the hub a lever 26, the fulcrum of the lever being at the center; and the ends of the lever are connected with the blocks through the medium of rods 27, and the blocks are forced in direction of the fixed sleeves 17, when the tubes 16, which may be properly termed the arms of the mill, are rapidly revolved, but the blocks are normally held away from the sleeves by means of interposed springs 28.

The construction of the upper arms is identical with that of the lower arms, as has been heretofore stated, and when two arms are employed one stands at a right angle to the other, as shown in Fig. 1, and the upper hub 15, instead of being of a cruciform shape is shaped approximately as a T.

It is obvious that when the sliding blocks engage with the fixed sleeves the vanes will be carried edge to the wind, and at that time the blocks serve in the capacity of governors. When the wind is too high, or has more than a predetermined speed, the sliding blocks will automatically travel outward and engage with the sleeves and control the speed. The blocks or governors may be operated from the ground in many ways, but preferably it is done through the medium of a lever 29 which is fulcrumed at one end upon the lower hub 14, as shown in Fig. 1, and the opposite end of the lever has an attached weight 30.

At the fulcrumed end of the lever an arm 31, is secured, and to this arm one end of a rod 32, is connected. This rod extends along one of the tubes of the lower arm, and passes into an opening 33 in the arm, as shown in Fig. 3, and that portion of the rod extending in the opening is slightly bent so that it may strike the inner end of the sliding block in that arm. A similar rod 34, is located upon the upper arm, and this rod is connected with the lever 30 through the medium of an elbow lever 35, fulcrumed upon the upper hub 15 and connected with the lower lever between its weight and fulcrum by a link 36, as shown in Fig. 1.

Around the outer portion of the stand pipe a ring 37, is placed, and from this ring are pendent at opposite sides, rods 38, and these rods extend downward to within convenient reach from the ground. It is therefore evident that when the rods 38 are pushed upward the ring will lift the weighted end of the lever 29, and will throw the rods 34 and 32 outward to a contact with the sliding blocks, and will force the sliding blocks to an engagement with the fixed sleeves 17, and the shafts 21 will be given about a quarter turn, thereby feathering the vanes or presenting their edges to the wind.

The stand pipe is provided with a nozzle 39, located at any convenient distance above the ground, through which the water pumped from the well or other quarter is to fall; and at one point the stand pipe is enlarged, as shown at 40 in Figs. 1 and 6, in order that a miter pinion 41, may be placed upon the shaft, and this pinion is made to mesh with a bevel gear 42, mounted upon a short shaft 43, made to revolve in the stand pipe. This shaft 43, may be revolved by means of a crank 44, and the main shaft of the mill may be revolved and pumping accomplished even when there is no wind. Or a pulley may be placed upon the shaft 43, from which power may be taken.

It is preferred when mechanism is employed to operate the pump by hand as well as by the mill, that the shaft 12 be made in two sections coupled within the housing 40, the coupling being so effected that the mill will not be operated when the hand attachment is in use.

The pump B illustrated, is a double acting pump, although any pump may be employed; and the shaft at its lower or solid end is formed with a crank to operate the pump pistons.

The simplicity and durability of this wind mill are apparent as is likewise the convenience with which it may be thrown in the wind from the ground, and the accuracy with which it will automatically operate and feather its vanes when the wind blows too strong.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In a wind mill, the combination, with the wind wheel shaft, of tubular arms located at angles to each other and connected with the shaft, and fixed sleeves located in the ends of the arms, the said sleeves having inner clutch surfaces, bearings held to turn in the sleeves, a shaft fixed to the bearings and extending from end to end of the arms, vanes secured to the ends of the shafts, reversely placed, and governor blocks held to slide upon the shafts, one opposite each sleeve, the ends of the blocks opposite the sleeves having clutch surfaces to engage with the like surfaces of

the sleeves, substantially as and for the purpose specified.

2. In a wind mill, the combination, with the wind wheel shaft, of tubular arms located at angles to each other and connected with the shaft, and fixed sleeves located in the ends of the arms, said sleeves having inner clutch surfaces, bearings held to turn in the sleeves, a shaft fixed to the bearings and extending from end to end of the arms, vanes secured to the ends of the shafts, reversely placed, governor blocks held to slide upon shafts, one opposite each sleeve, the ends of the blocks opposite the sleeves having clutch surfaces to engage with the like surfaces of the sleeves, a lever and connecting rods uniting the governor blocks of an arm, shifting rods located upon the arms, levers carried by the arms and connected with the shifting rods, and means, substantially as shown and described, for operating the levers, as and for the purpose specified.

3. In a wind mill, the combination, with the wind wheel shaft, and tubular arms connected with the shaft, of vanes carried by the arms and reversely located, the vanes extending farther below than above the arms, a shaft connecting the vanes of an arm, a governor centrifugally operated, sliding upon the vane shafts, and a clutch mechanism contained in the arms and adapted for engagement with the governor, substantially as shown and described.

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