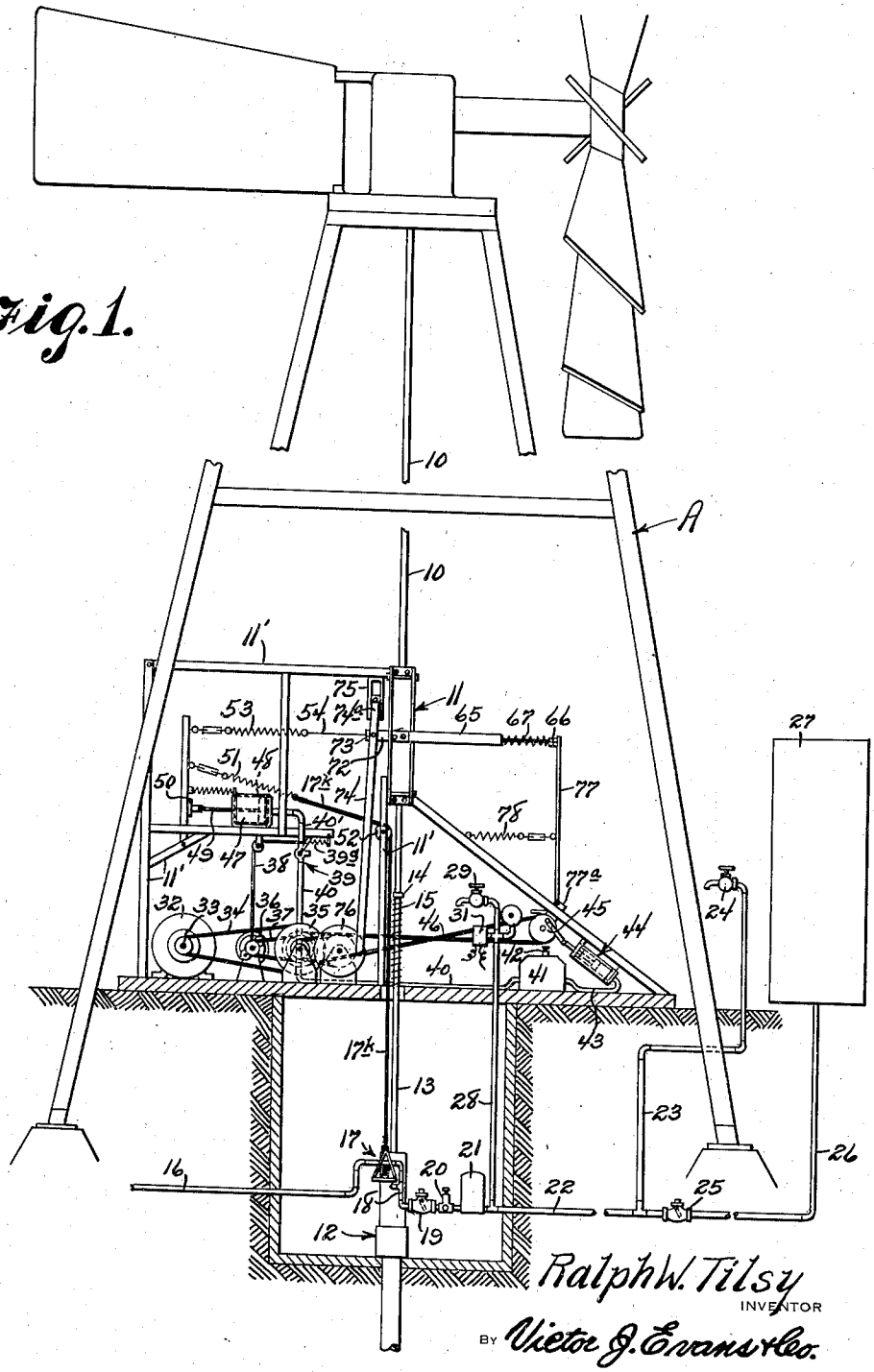
Sept. 30, 1941. R. W. TILSY 2,257,660

PUMPING SYSTEM

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Fig. 1.



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Fig. 2.

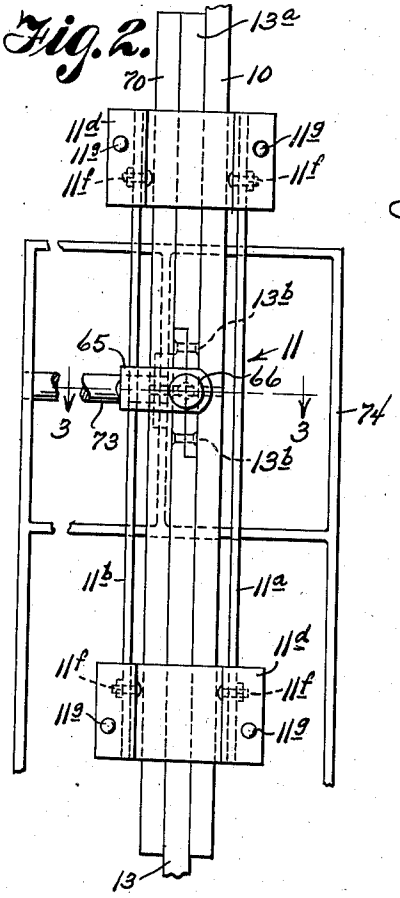


Fig. 3.

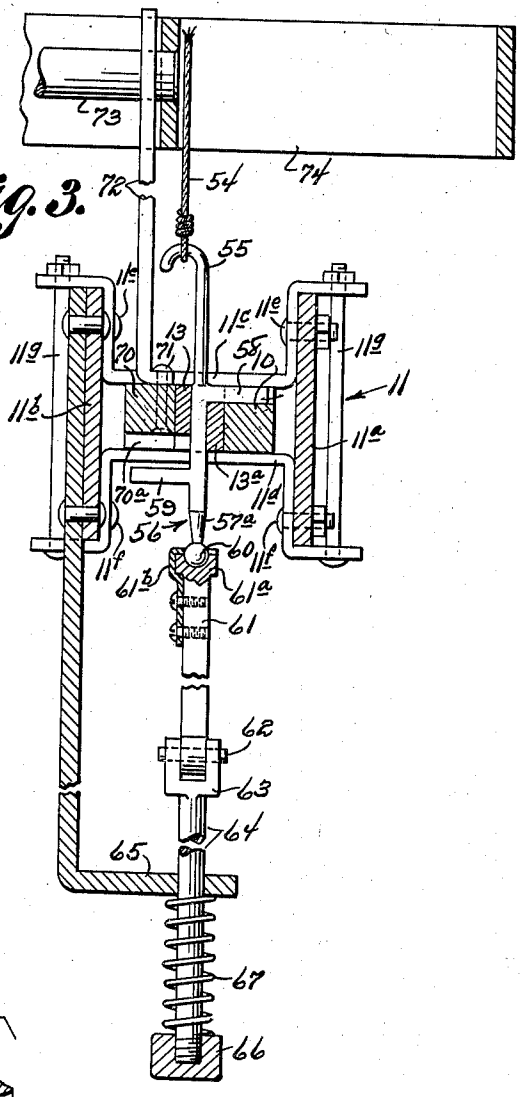
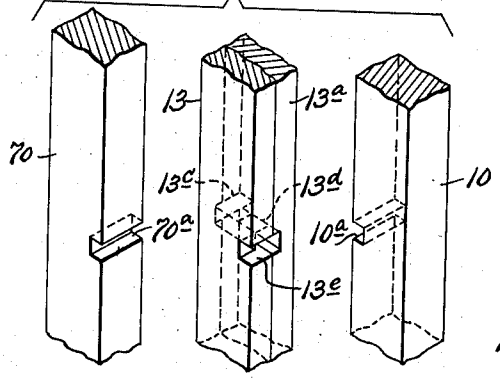


Fig. 4.



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Fig. 5

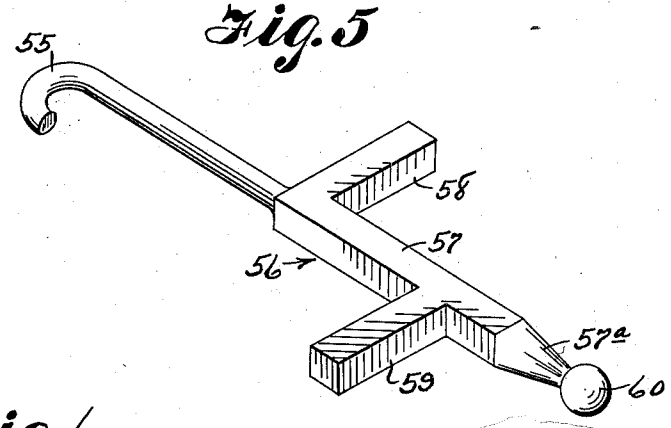


Fig. 6.

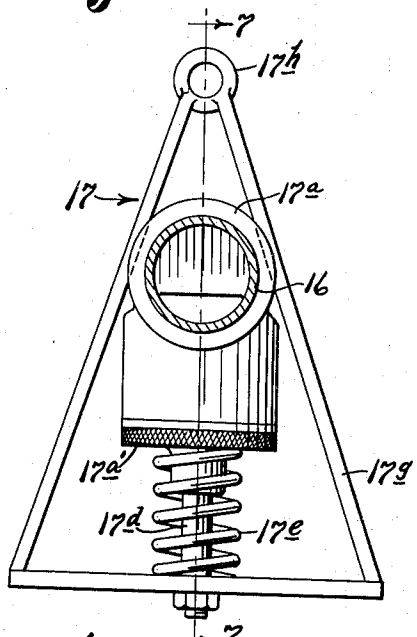


Fig. 7.

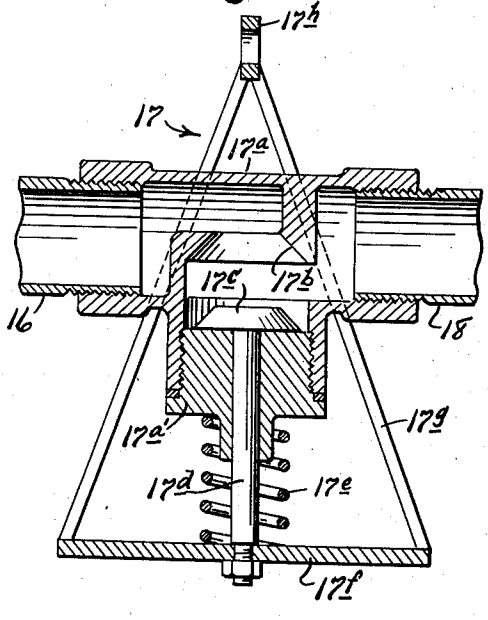
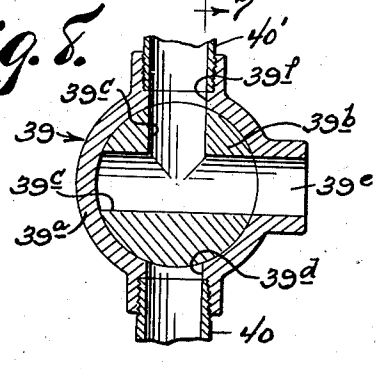


Fig. 8.



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Patented Sept. 30, 1941 2,257,660

UNITED STATES PATENT OFFICE

2,257,660

PUMPING SYSTEM

Ralph W. Tilsy, Orland Park, Ill.

Substituted for abandoned application Serial No. 195,096, March 10, 1938. This application October 9, 1939, Serial No. 298,673

3 Claims. (Cl. 103—207)

This case is a substitute for abandoned patent application of Ralph W. Tilsy for an improved Farm fresh water system, Serial No. 195,096, filed March 10, 1938.

This invention relates to improvements in rural water supply systems and especially is concerned with a novel device for controlling fluid supplied by a windmill operated pump whereby the pressure of fluids so supplied is maintained substantially constant despite drain of the fluid supply.

The novel device according to the instant invention is of especial application to rural uses wherein a wind driven pump serves normally to provide the establishment with water for at least a majority of its uses but wherein occasionally relatively large drains of the water supply are made which indicate a necessity for auxiliary pumping means to satisfy the occasional or periodic abnormal requirements.

A feature of the novel pumping system according to the instant invention is that it includes means sensitive to change of pressure in the fluid transmission network fed by the wind driven pump whereby an auxiliary power driven unit is automatically coupled with the pumping system for operating same.

It is an object therefore of this invention to provide the aforesaid type of fluid pressure sensitive means for automatically coupling a fluid supply pump with an auxiliary power source.

A feature of the novel device according to this invention is that although the pump may operate constantly to supply fluid both for use and for storage, the actuation of the pressure sensitive means serves, in addition to accomplishing the above mentioned effects, to stop shutoff and terminate the supply of fluid to the storage tank, thereby assuring maximum flow of fluid to those places where fluid is being used.

An important advantage of the novel fluid supply system according to the instant invention is that the elements thereof are structurally relatively simple and, being largely uniform or standard parts, are readily available on the market or can easily be manufactured under conditions of mass production, thereby minimizing the initial cost of the device. The structural simplicity of the device also is important in that thereby is minimized the cost of upkeep and/or of repair.

Other objects, advantages and features of the new and improved pumping system according to the present invention will be apparent to those skilled in this art during the course of the following description.

Regarded in certain of its broader aspects the present invention comprises the combination with a wind driven pumping system of the type including a power driven vertically reciprocating bar, a vertically reciprocating mill head and a reciprocating pump shaft normally spring urged into coupled relation thereto feeding a fluid transmission network, of means sensitive to fluid pressure in said network for, upon occasion, uncoupling said mill head and pump shaft and simultaneously coupling said pump shaft and said vertically reciprocating bar for driving the pump, the said means comprising a pressure sensitive motor unit, a horizontally sliding key carried on said pump shaft separately engaging key ways formed in said bar and said mill head and operable by said motor for moving said key from the spring urged coupled relation causing engagement with said bar.

In order to facilitate a fuller and more complete understanding of the present invention, a specific embodiment thereof herein illustrated will be hereinafter described, it being clearly understood, however, that the illustrated embodiment, although presently preferred, is provided solely by way of example of the practice of this invention and not by way of limitation thereof except insofar as the invention is recited in the subjoined claims.

Referring then to the drawings,

Figure 1 is substantially a side elevational view of the presently preferred embodiment of this invention illustrating the same under conditions of use,

Fig. 2 is a detail front elevational view of a portion of the device illustrated in Fig. 1, parts being broken away for clearness of illustration,

Fig. 3 is a horizontal sectional view of Fig. 2 taken along the line 3—3,

Fig. 4 is a detail perspective view of fragments of certain of the reciprocating members forming part of the device,

Fig. 5 is essentially a perspective view of the sliding key member forming part of the device,

Fig. 6 is essentially an end elevational view of one of the valves forming part of the device according to this invention,

Fig. 7 is essentially a vertical sectional view of Fig. 6 taken along the line 7—7, and

Fig. 8 is a sectional view of a three-way valve forming part of the device according to this invention.

Referring now to the drawings for a description of the illustrated preferred embodiment of this invention, it will be noted that a windmill generally designated by the reference character A and having a vertically reciprocating mill head 10 terminating within a cage 11 supported on the frame 11' is coupled by means, which will be hereinafter described, to the drive shaft of a pump 12 located in the pump well substantially as shown, it being noted of course that the pump shaft is designated by the reference character 13, the end of the pump shaft extending upwardly and also being received within the cage generally designated by the reference character 11.

Referring now especially to Figs. 2 and 3 it will be noted that the cage 11 comprises a pair of spaced parallel plates 11a and 11b held in fixed relation by cross members 11c and 11d, four of which are provided, two on each end of the plates attached thereto by fastening means 11e, 11f and 11g. Between the cross pieces 11c and 11d the end portions of the mill head 10 and of the pump shaft 13 are received, being freely slidable with respect to each other. The means for coupling the mill head and pump shaft will subsequently be described, but for present purposes it is to be understood that upon occasion, as will hereinafter appear, these members can be coupled. It will be perceived from Fig. 1 that the pump shaft 13 is normally urged upwardly by a collar 14 attached thereto against which spring-pressing means 15, sleeved around the shaft, acts.

Fluid from the pump 12 passes to the line 16 from whence it is conveyed to an appropriate storage tank, it being noted that the flow of fluid in the line 16 is controlled by a valve generally designated by the reference character 17, details of which are best illustrated in Figs. 6 and 7. It will be noted that the valve 17 comprises a casing 17a which is essentially T-shaped and includes an internal partition provided with a valve seat 17b extending therethrough against which may rest a valve member 17c carried on a sliding rod 17d mounted in the plug 17a' and normally pressed into open position by the spring 17e sleeved around the rod 17d and acting against portions of the plug 17a' and the plate 17f mounted on the free end of the rod. The plate is provided with upwardly extending connector elements 17g terminating in a loop 17h to which is connected a relatively inextensible cable 17k operable as hereinafter will be described.

Fluid from the pump 12 passes as above described through the line 16 and also, upon occasion, may pass through the check valve 19, relief valve 20 and hydraulic cushion 21 to the feed line 22 communicating with the pipe line 23 which is connected to a supply faucet 24, the last mentioned being conveniently located in a locality where water is used. Upon occasion a portion of the fluid in the line 22 passes through the check valve 25 to the pipe line 26 from whence the fluid passes to the storage tank or so-called pressure tank 27 preferably located in the top of the building being supplied or at least in a relatively raised position. A line 28 connected to the line 22 and terminating in a faucet 29 is useful for providing fluid to be used in the vicinity of the pump and on this line also are provided a pressure gauge 30 and a pressure sensitive electrical switch 31. It is to be understood that the switch 31 is sensitive to and operable by changes in pressure of the fluid in the several pipe lines connected to the line 22 and, accordingly, that the switch can, upon occasion, be operated by opening of the faucet 24 whereby the pressure in the mentioned lines is diminished.

The switch 31 above described controls the current supply of a motor 32 whereby diminution in pressure of the fluid in the mentioned pipe lines causes operation of the switch and starting of the motor. The motor shaft carries a pulley 33 which is connected by the belt 34 with a transmission pulley 35 which in turn is connected with a governor 36 by a belt 37. As the speed of rotation of the governor 36 increases, tension is exerted in the line 38 connected thereto causing operation of a valve generally designated by the numeral 39 controlling flow of fluid from the pipe 40 to the pipe 40'. Reference is made to Fig. 8 wherein details of the valve 39 best are illustrated and from which it will be noted the valve comprises a casing member 39a within which is positioned a rotatable valve member 39b having a diametrically extending opening 39c formed therein communicating with a radially extending perpendicularly positioned opening 39c'. It will be seen that the valve casing 39a is provided with three spaced openings 39d and 39e and 39f registerable upon occasion with openings 39c and 39c' of the valve member 39b. The valve member normally is held in the position illustrated in Fig. 8 by spring tensioning means 39g, but the valve may be swung through approximately an arc of a right angle by tensioning of the cable 38 as above mentioned. It will be noted that in the normal position of the valve the pipe line 40' is in communication with the atmosphere through the opening 39e of the valve casing, but when the valve member is moved as aforesaid, the pipe lines 40 and 40' communicate.

The pipe line 40 is connected to a fluid storage chamber 41 provided with a relief valve 42 which, in turn, is connected by the pipe line 43 with a compressor 44 driven by the eccentric 45 connected by the belt 46 to the differential pulley 35 which, it will be recalled, is driven by the motor 32 as above described. The operation of the motor causes operation of the compressor 44 and provides an appreciable fluid pressure in the storage tank 41 and, accordingly, when the valve generally designated by the numeral 39 is opened, the fluid from the storage tank discharges through the pipe line 40 to the pipe line 40' which is connected to a piston chamber 47 wherein a piston 48 slides, thereby causing the piston to move which, in turn, acts through the piston rod 49 to cause counterclockwise rotative motion of the arm 50 which is pivotally mounted on parts of the frame 11' and which is connected to the piston rod as shown. The counterclockwise rotation of the lever arm 50 tensions the spring 51, thereby exerting a pulling action on the cable 17h, causing closing of the valve generally designated by the numeral 17 whereby the total output of the pump 12 is directed into the pipe line 18.

Counter-clockwise motion of the lever arm 50 also tensions the spring 53 exerting pulling action on the cable 54 connected thereto which is connected in turn to a hooked end portion 55 of a sliding key 56.

Referring now especially to Figs. 2, 3, 4 and 5, it will be noted that the key generally designated by the numeral 56 comprises a central portion 57 and spaced parallel oppositely extending key elements 58 and 59 formed thereon.

Referring now to Fig. 4, it will be noted that a key-way 10a is formed in a side portion of the mill head 10 to receive the key 58 and that a corresponding and registerable opening 13c is formed in the pump shaft 13. As will be evident from consideration of the drawings, the upper end of the pump shaft 13 is split and the portion 13a thereof is attached to the main body of the shaft 13 by appropriate fastening means 13b. This structure is provided to facilitate the sliding motion of the key 56 within a horizontally extending opening 13d formed in the shaft elements and extending across the interface. A cut-away portion 13e formed in the shaft 13 is provided to receive the key 59 for purposes which hereinafter more fully will be apparent.

It will be perceived that when the key 58 is positioned within the key-way 10a of the mill head

10 and the opening 13c formed in the pump shaft end portion, the mill head and pump shaft will be coupled whereby the reciprocating motion of the former will cause reciprocating motion of the latter, whereby the pump is operated. This is the normal condition and to facilitate continuous coupling of the mill head and the pump shaft under normal conditions, the end portions 57a of the key 56 is provided with a ball 60 integrally formed therewith which is held in a socket formed in the end part 61a of a coupling member 61, but is held in position therein by a cap 61b substantially as is illustrated in Fig. 3. The opposite end of the coupling 61 is pierced to receive the pivot 62 carried in a yoke 63 mounted on an end portion of a rod 64 slidingly carried in an opening formed in the bracket 65 mounted on parts of the supporting frame. The rod is provided with a cap 66 on the end thereof against which acts a spring 67 serving normally to urge the rod outwardly assuring coupling of the mill head and pump shaft as hereinabove described.

A vertically freely reciprocal bar 70 provided with a key-way 70a in a side thereof registerable with the opening 13e in the side of the pump shaft 13 is slidingly mounted in the cage generally designated by the numeral 11 and carries attached thereto by a fastening means 71 a horizontally extending bracket 72 which is provided with an opening in the distal end part thereof to receive the rod 73 carried upon the vertically reciprocable frame 74, the end portion 74a of which is freely slidingly mounted in the bracket 75 attached to parts of the frame 11'. The frame 74 is reciprocated by the wheel 76 driven by the motor 32 whereby, when the motor is in operation, the frame 74 continuously reciprocates, thereby causing vertical reciprocation of the bar 70.

When, as hereinabove described, the cable 54 is tensioned by counter-clockwise rotation of the arm 50, the key generally designated by the numeral 56 is moved against the pressing action of the spring 67 whereby the key element 59 is positioned in the openings 13e of the pump shaft 13 and the key-way 70a of the bar 70, thereby operatively coupling the pump shaft and reciprocating bar. It will be evident of course that when the bar and shaft are so coupled, the key element 58 becomes disengaged from the mill head whereby operation of the pump shaft by the motor through the reciprocating bar is permitted.

Experience indicates that frequently the locking of the key element 58 in engagement with the mill head and pump shaft is such as to make difficult disengagement by tensioning the cable 54 and, accordingly, a small hammer lever 77 tensioned against the head 66 of the rod 64 by means of the spring 78 is provided for facilitating the disengagement and for augmenting the force applied to the key 56 by tensioning the cable 54. The hammer arm 77, which is pivotally mounted on a bracket 77a, is operable from the shaft to the compressor eccentric 45 by conventional means not illustrated.

It will be evident from the foregoing that in operation the device according to the present invention provides means for bypassing flow of fluid from a pump driven by a windmill whereby discharge of the fluid to a storage tank is prevented and whereby maintenance of fluid in a transmission network is assured. It will be apparent from the foregoing that lowering of fluid pressure in the transmission lines causes operation of the pressure sensitive switch whereby the pump is disengaged from the windmill and is operated preferably at a higher speed by electric power. It of course will be understood that instead of the electric motor above described, other types of motors can be used, such as gas engine, steam engine, or the like.

It is to be understood of course that this invention is capable of extended application and is not confined to the precise illustrated forms nor described construction and, therefore, such changes and modifications may be made therein as do not affect the spirit of the invention nor exceed the scope of the appended claims.

Having thus described the present invention, what it is desired to secure by Letters Patent is:

1. In a wind driven pumping system, comprising a fluid pressure pipe line, a power pump in said pipe line, a reciprocating mill head having a key way formed therein, a power driven reciprocating bar having a key way therein, a reciprocating cage surrounding the mill head and the reciprocating bar, a pump rod having its upper end within the cage and provided with a key way, a transverse key sliding in the cage for selectively engaging the key way in the mill head or the reciprocating bar, a power motor having a pitman connected to the reciprocating cage, and pressure operated means whereby the mill head may be disconnected from the pump rod.

2. In a wind driven pumping system, comprising a fluid pressure pipe line, a power pump in said pipe line, a reciprocating mill head having a key way formed therein, a power driven reciprocating bar having a key way therein, a reciprocating cage surrounding the mill head and the reciprocating bar, a pump rod having its upper end within the cage and provided with a key way, a transverse key sliding in the cage for selectively engaging the key way in the mill head or the reciprocating bar, a motor, a pitman operated by the motor and connected to the cage, and means operated by the fluid pressure in the pipe line for starting the motor and simultaneously starting a mechanism for moving the key to disconnect the mill head from the pump rod.

3. In a wind driven pumping system, comprising a fluid pressure pipe line, a power pump in said pipe line, a reciprocating mill head having a key way formed therein, a power driven reciprocating bar having a key way therein, a reciprocating cage surrounding the mill head and the reciprocating bar, a pump rod having its upper end within the cage and provided with a key way, a transverse key sliding in the cage for selectively engaging the key way in the mill head or the reciprocating bar, a motor, a pitman driven by the motor and connected to the reciprocating cage, a pressure system connected to the pump, a pressure operated means within the fluid pressure pipe line for starting the motor, a second pressure system, and a pressure operated means within the second pressure system for moving the key to disconnect the mill head from the pump rod.

RALPH W. TILSY.