(No Model.) 2 Sheets—Sheet 1.

P. A. HUMBERT.

TRANSMISSION OF POWER FOR OPERATING PUMPS IN MINES.

No. 301,992. Patented July 15, 1884.

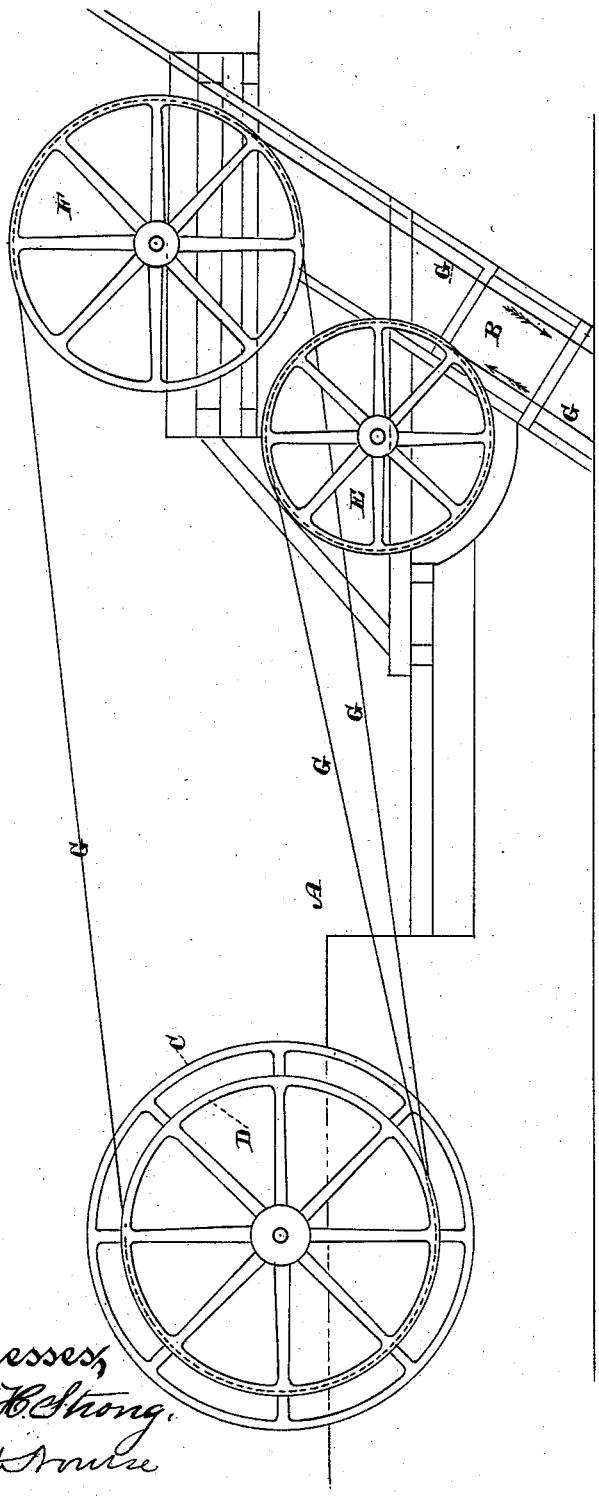

FIG. 1.

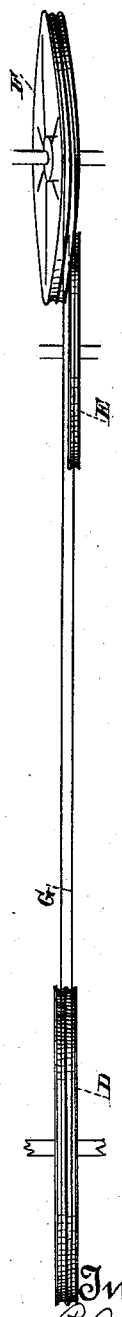

FIG. 2.

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FIG. 3.

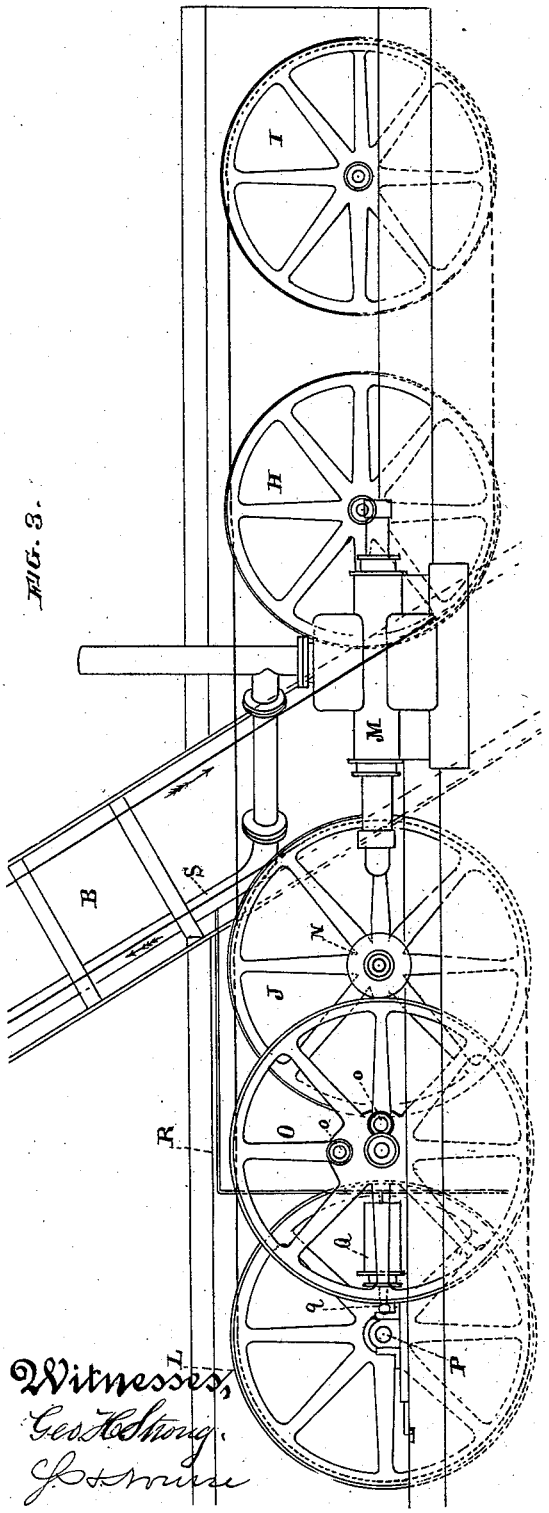
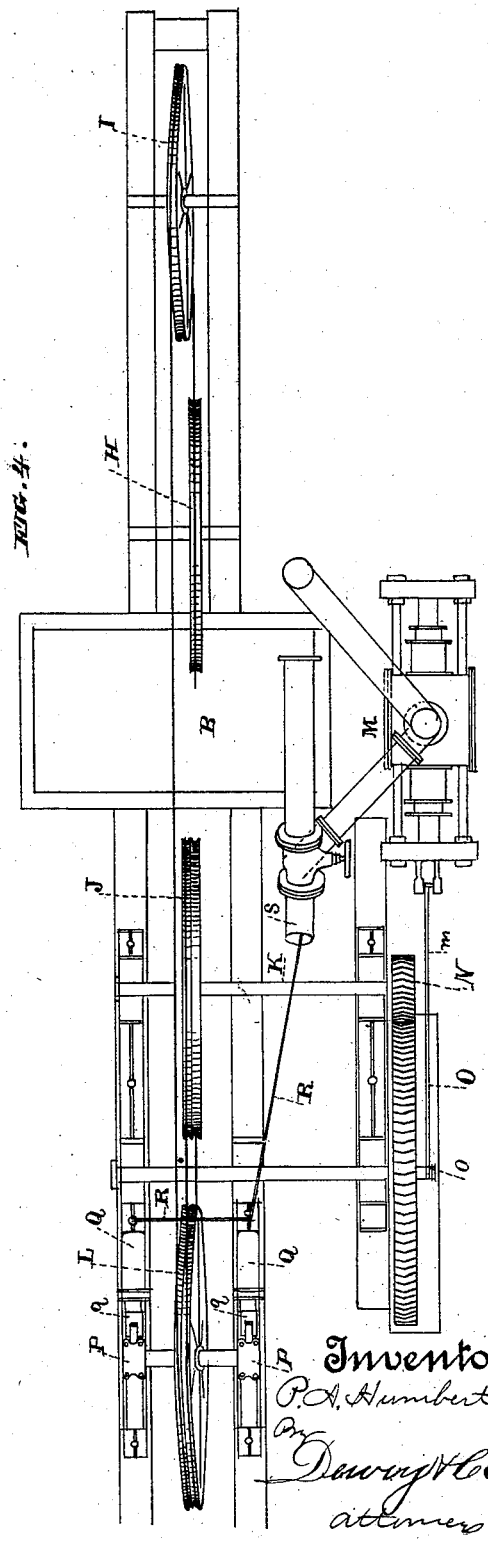


FIG. 4.



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UNITED STATES PATENT OFFICE.

PIERRE A. HUMBERT, OF VIRGINIA CITY, NEVADA.

TRANSMISSION OF POWER FOR OPERATING PUMPS IN MINES.

SPECIFICATION forming part of Letters Patent No. 301,992, dated July 15, 1884.

Application filed November 12, 1883. (No model.)

To all whom it may concern:

Be it known that I, PIERRE A. HUMBERT, of Virginia City, county of Storey, and State of Nevada, have invented an Improvement in Transmission of Power for Operating Pumps in Mines; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to a new and useful method, mode, or system for transmitting power from the surface through the shaft of a mine to operate the pumps; and it consists in working the pumps by means of an endless wire rope or cable passing over and driven continuously by a peculiar arrangement of sheaves, and connected suitably with the pumps. Details of construction and arrangement of sheaves and devices to provide for the proper tension on the cable, the freedom of the shaft, and the course of the cable form part of and complete my invention.

The object of my invention is to operate the pumps continuously by means which are most advantageous in original cost of construction, in lightness, strength, and the space they occupy, and in general efficiency, all of which will be more fully explained hereinafter, reference being made to the accompanying drawings, in which—

Figure 1 is a side elevation of the sheaves at the surface, showing the course of the wire rope or cable. Fig. 2 is a plan of same. Fig. 3 is a side elevation of the sheaves, gearing, and pump in the mine. Fig. 4 is a plan of same.

A is the surface of the ground, and B is one shaft of the mine.

C is the main driving-sheave, to which power is to be transmitted in any suitable manner. It carries on its shaft a sheave, D, having a double face, Fig. 2.

E is a deflecting-sheave near the mouth of the shaft and in line with sheave D.

F is a directing-sheave mounted on an incline, as shown in Fig. 2, for the purpose of keeping the rope or cable from chafing, as I shall presently explain. This sheave has a double face, Fig. 2.

The wire rope or cable is designated by G, and its course above the ground is as follows: Coming up out of the shaft, as represented by the ascending arrow in Fig. 1, it passes over the deflecting-sheave E; thence to, under, and over the sheave D on its near face; thence to, over, and under the near face of inclined sheave F, by which it is led past itself without chafing; thence to, under, and over the off face of sheave D; thence again to the sheave F to its off face, by which direction it is led past itself again without chafing, and thence down the shaft, as indicated by the descending arrow in Fig. 1. At the bottom of the shaft, and to one side, is a sheave, H, Fig. 3, which receives and deflects the cable as it comes down the shaft. Behind it is a sheave, I, mounted on an angle, as shown in Fig. 4. On the other side of the shaft is a double-faced sheave, J, mounted on a shaft, K. Behind this sheave is a double-faced sheave, L, mounted on an angle. The course of the cable over these sheaves is as follows: It comes down the shaft, as indicated by the descending arrow in Fig. 3, and passes under the deflecting-sheave H to, under, and over the inclined sheave I, which, by reason of its inclination, leads it past itself without chafing. It thence passes across the bottom of the shaft to the inclined sheave L, over, around, and under the off face of which it passes back to the off face of directing-sheave J, under and over which it passes back again to the near face of sheave L; thence forward again to the near face of sheave J, and up the shaft, as indicated by the ascending arrow in Fig. 3. The inclination of sheaves I and L prevents the cable from chafing itself, and enables me to lead it back and forth to obtain the necessary driving-tension. It will be observed that these sheaves are all without the area of the shaft, which is advantageous in not encumbering it. Single compartment-shafts are never constructed very large, and it is of great importance to keep them as free as possible. This I do with the endless wire-rope, which takes up little room, and is therefore an improvement on the Cornish pump which so encumbers the shaft. For a like reason my sheaves are placed out of the way of the shaft.

The arrangement and number of sheaves as herein shown could be altered in slight particulars; but for practical working I deem the best arrangement to be as I have described, for reasons which will be obvious to those skilled in engineering or the practical operations of machinery, and therefore unnecessary to mention here.

M is a pump, with the piston of which is connected the pitman-rod *m*. On the shaft K is a pinion, N, which meshes with a large gear, O, having a crank-pin, *o*, with which the pitman-rod *m* of the pump connects, whereby, through the power of the traveling belt, the pump is operated.

It is obvious that though I have herein shown but one level and one pump in the mine, I could apply the same system to as many levels and as many pumps as are necessary. There is one important feature which requires to be provided for in this employment of an endless traveling cable, and that is to take up the slack or tighten the cable. When a cable is used in a horizontal plane (or nearly so) as a means for transmitting power, the sag of the cable itself serves to tighten it; but in sending it down the shaft of a mine, which is nearly always vertical, or approaches to it, there is no sag of the cable, and consequently some positive means must be used to tighten it. I accomplish this necessary result in the following manner: The double-faced inclined sheave L down in the mine is mounted in pillow-blocks P, set in guides and adapted to slide therein. In front of these, on the supporting frame-work, are pressure-cylinders Q, having solid plungers or pistons, the rods *q* of which are connected with the pillow-blocks. A pressure-pipe, R, leads from the pump-column S in the shaft to the pressure-cylinders. The weight of the water in the pump-column is therefore always upon the plungers of the cylinders the rods of which press back the pillow-blocks continuously, and thus force back the sheave L to keep the cable tight.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The improved system for transmitting power from the surface for operating the pumps in a mine, consisting of an endless traveling wire rope or cable passing down and up the shaft, and supported and guided upon and by sheaves within the mine and on the surface, and driven by power from the surface, a mechanism for taking up the slack or tightening the wire rope or cable, and a mechanism for taking the power of the wire rope or cable and transferring it to the pumps, substantially as herein described.

2. In a system for transmitting power from the surface to operate pumps within a mine by means of an endless traveling wire rope or cable passing down and up the shaft, the guide-sheave E at the mouth of the shaft for deflecting the cable from the shaft, the sheave D on the main driving-shaft, for leading the cable round, and the guide-sheave F at the mouth of the shaft, for directing it down again, substantially as herein described.

3. In a system for transmitting power from the surface to operate pumps within a mine by means of an endless traveling wire rope or cable passing down and up the shaft, the guide-sheave E at the mouth of the shaft for deflecting the cable from the shaft, the double-faced sheave D on the driving-shaft for leading the cable round and driving it, and the double-faced sheave F, set on an angle, for preventing the cable from chafing and directing down in the shaft, substantially as herein described.

4. In a system for transmitting power from the surface to operate the pumps in a mine by means of an endless traveling wire rope or cable passing down and up the shaft, a sheave on each side of the shaft at its bottom for deflecting and directing the cable from and to the shaft, and a sheave at one side for leading it round, substantially as herein described.

5. In a system for transmitting power from the surface to operate the pumps in a mine by means of an endless traveling wire rope or cable passing down and up the shaft, a sheave on each side of the shaft at its bottom for deflecting and directing the cable from and to the shaft, a sheave for leading it round said sheave, being mounted in sliding pillow-blocks, and a mechanism for pressing said sheave back to take up the slack or tighten the cable, substantially as herein described.

6. In a system for transmitting power from the surface to operate the pumps in a mine by means of an endless traveling wire rope or cable passing down and up the shaft, sheaves at the bottom of the shaft for deflecting and directing the cable from and to the shaft, the sheave L, for leading it round, the sliding pillow-blocks P, in which said sheave is mounted, the pressure-cylinders Q, and pistons *q*, connected with the pillow-blocks, and the pressure-pipe R from the pump-column in the shaft to the pressure-cylinders, substantially as herein described.

7. In a system for transmitting power from the surface to operate the pumps in a mine by means of an endless traveling wire rope or cable passing down and up the shaft, the sheave H at the bottom for deflecting the cable, the sheave I behind it and mounted on an angle for leading it round and preventing it from chafing, the double-faced sheave L, mounted on an angle, for receiving and leading it back and preventing it from chafing, and the double-faced sheave J, for leading and directing it up into the shaft, all arranged and operating substantially as herein described.

8. In a system for transmitting power from the surface to operate the pumps in a mine by means of an endless traveling wire rope or cable passing down and up the shaft, deflecting, directing, and leading sheaves for said cable in the bottom of the shaft, and the means for taking the power of the cable and transferring it to the pump, consisting of the pinion N on the shaft K, on which one of said sheaves is mounted, the large gear O, meshing with the pinion and having crank-pin *o*, connected with the pitman of the piston of the pump, substantially as herein described.

9. In a system for transmitting power from the surface to operate the pumps in a mine by

means of an endless traveling wire rope or cable passing down and up the shaft, the deflecting-sheave E at the mouth of the shaft, the double-faced driving-sheave D, and double-faced inclined directing-sheave F, all at the surface, and arranged as shown, in combination with the deflecting-sheave H, the inclined leading-sheave I, the inclined double-faced leading-sheave L at the other side, and the double-faced directing-sheave J, all at the bottom of the shaft, and arranged substantially as herein shown and described.

In witness whereof I have hereunto set my hand.

PIERRE A. HUMBERT.

Witnesses:
C. D. COLE,
J. H. BLOOD.