J. H. DODSON.

FLUID CLUTCH.

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1,042,410. Patented Oct. 29, 1912.

Fig. 1.

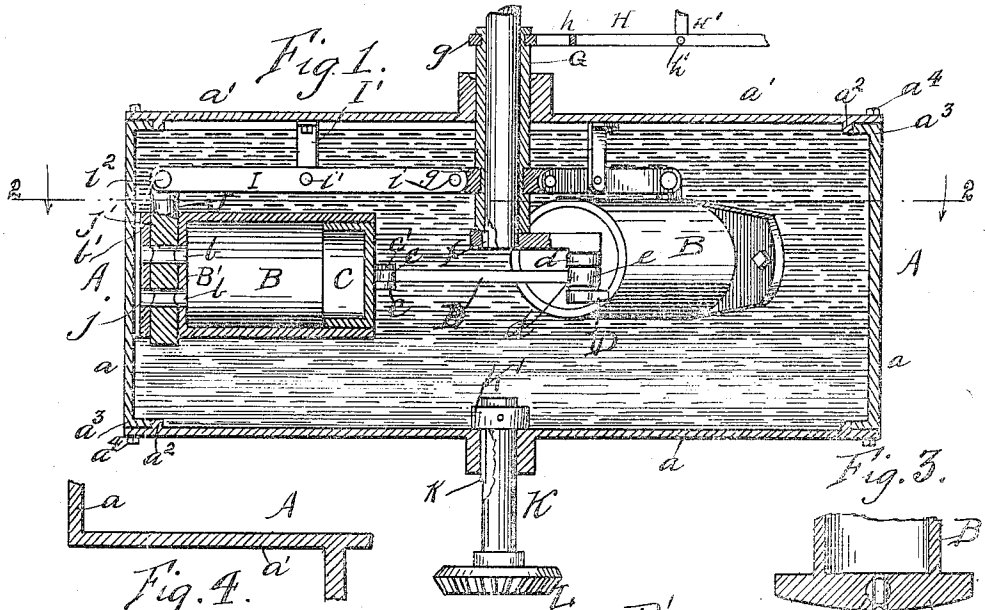
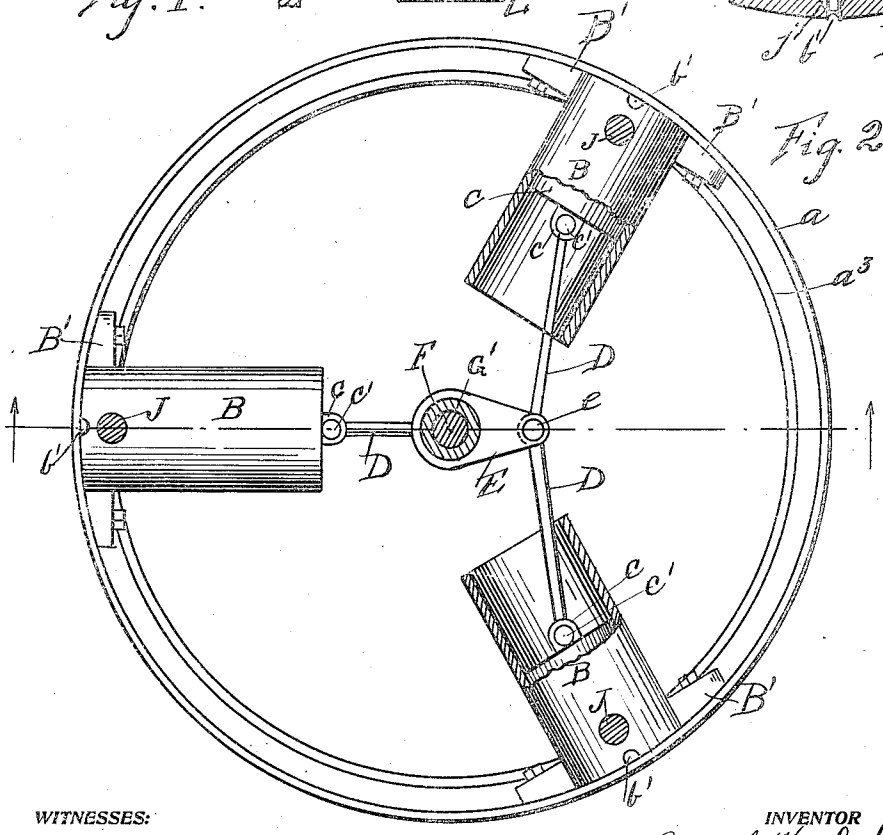


Fig. 3.

Fig. 4.

Fig. 2.



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FLUID-CLUTCH.

1,042,410. Specification of Letters Patent. Patented Oct. 29, 1912.

Application filed December 5, 1907. Serial No. 405,156.

To all whom it may concern:

Be it known that I, JOSEPH H. DODSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fluid-Clutches, of which the following is a specification.

The object of my invention is to construct a simple, practical, positive and reliable connecting mechanism between a driving shaft of a motor, engine or other power supplying means, and a driven shaft or other appliance or device for applying the produced power for the use or purpose desired or intended, and which will perform the office of transmitting the power without any jar or concussion in making the connection or changing the speed and by which the speed can be reduced or increased without any trouble or inconvenience and without injurious effects in making the change.

The invention consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings illustrating the invention, Figure 1 is a sectional plan view; Fig. 2 is a sectional elevation on line 2 of Fig. 1. Fig. 3 is a detail in section of the closed or head end of one of the liquid pressure cylinders; and Fig. 4 is a detail in section showing a modification in the construction of the cylinder or drum, in which the peripheral wall and one of the end or side walls are formed integral.

In carrying out my invention, a cylinder or drum A capable of containing a liquid, such as glycerin or oil for instance, is employed. This cylinder or drum A is constructed of metal or other suitable material, and has a peripheral wall a and a side or end wall a', and, as shown in Fig. 1, each end wall has on its inner face an annular flange or rim a^2 against which abuts a rim a^3 of the peripheral wall so as to form a perfectly tight joint between the peripheral wall and the side or end wall; and, as shown in Fig. 1, the peripheral and side or end walls are made separate and united by suitable lag or other bolts a^4, and, as shown in Fig. 4, the peripheral and one of the side or end walls are made in one piece or integral. The peripheral wall has attached thereto at regular intervals apart inner cylinders B each of which has operating therein a piston or plunger C, and, as shown, three cylinders B are employed each having a piston or plunger. Each cylinder at the outer end or end adjacent to the peripheral wall has a closed end or head B′ with flanges or ears through which bolts pass attaching the cylinder to the wall. The head or closed end B′ of each cylinder has therein, in the construction shown, ports or passages b parallel with the axial line of the inner cylinder and connecting with a transverse or cross passage b' in the end of the head or closed end, which passage at both ends opens into the chamber of the cylinder or drum so as to furnish communication between the interior of the cylinder or drum A and the exterior thereof, in the cylinder B by means of the passages in the head or closed end of the cylinder. Each piston or plunger has on its outer face ears c between which is pivoted, by a suitable bolt or pin c', the end of a connecting rod D, the other end of which has an eye d entered onto a wrist pin e of a crank arm E, which arm is attached to the crank or other driving shaft F of the engine or motor by a spline f so that the revolving of the shaft F revolves the crank arm E and through the connecting rods D reciprocates the several pistons or plungers in their respective cylinders.

A sleeve G surrounds the shaft F and is slidable thereon, and this sleeve and the shaft project through a suitable bearing or journal box on one of the side or end heads or plates of the cylinder or drum. The projecting end of the sleeve G has a circumferential groove in which is located a ring g to which is pivoted the fork h of a lever H, pivoted to a support H′ by a suitable pin or pivot h' so that the movement of the lever will slide the sleeve G in and out on the shaft. The end of the sleeve which lies within the cylinder or drum A has a circumferential groove which receives a ring g having thereon a series of ears, corresponding in number to the number of cylinders B, and between each pair or set of ears is pivoted, by a suitable pin or pivot i, one end of a lever or arm I mounted by a pin or pivot i', on a bracket or support I′ attached to the end or side wall of the cylinder or drum A, so that the lever will tilt or oscillate on its pivot with the reciprocating movements of the sleeve. The outer or free end of each lever or arm I is connected by a suitable pin or pivot i^2 with the end of a cut-off rod or

side valve J entered into a transverse hole j' radially disposed through the head or closed end of the cylinder B, which cut-off rod or side valve has radial ports or openings j coinciding with the ports or passages b when the parts are normal, so as to leave a full, clear passage between the transverse passage in the head or closed end of the cylinder and the interior of the cylinder through the passages or ports b and j, which opening or passage will be diminished by the movement of the cut-off rod or stem so as to cause the ports j to peripherally pass the openings or passages b reducing the size of the opening to the extent of the inward movement of the cut-off rod or stem and thereby reducing the amount of liquid drawn into and expelled from each cylinder by the operation of its piston or plunger.

The cylinder or drum A, at the axial center thereof, has attached to one of its heads a' a shaft or spindle K, and, as shown, the shaft or spindle passes through a hub or boss on the side or end head and is secured therein by a spline k, and the end of the shaft or spindle which projects into the interior of the cylinder or drum has thereon a collar or ring k', attached by a set screw or otherwise and abutting against the wall of the head. This shaft K revolves with the cylinder or drum, and, as shown, its outer end has fixed thereon a bevel gear L for transmitting the power produced by the revolution of the cylinder or drum, for which purpose a bevel gear corresponding to the bevel gear L may be employed, and it is to be understood that instead of a bevel gear connection any other suitable and well known driving connection may be employed.

The parts are assembled by attaching the controlling cylinders B to the peripheral wall of the cylinder or drum and inserting a piston or plunger C in each cylinder. The connecting rods D are attached one to each piston or plunger and entered onto the wrist pin e of the crank arm E. The sleeve G is entered into the bearing therefor on the end or side head or plate of the cylinder; the ring g' is inserted in the groove therefor in the collar; the arms or levers are connected with the ring and attached by the brackets to the side or end head or plate and the free or outer end of each lever is connected with the cut-off rod or stem therefor, which cut-off rod or stem has been entered into the cylinder head or closed end, and the head or plate having the sleeve and the parts connected therewith attached thereto is attached to the peripheral wall or lever, if made separate therefrom, by bolts or otherwise. The shaft F has entered thereonto the sleeve G and its end has keyed or otherwise fastened thereto the crank; the ring g is entered into the groove therefor in the sleeve, and the lever H is connected with the ring and with the support therefor so that its movements will slide the sleeve on the shaft end. The other side head or plate of the cylinder or drum has secured thereto at its axial center the shaft or spindle K and the side or end head or plate is then attached to the peripheral wall of the cylinder or drum by suitable bolts or otherwise, assembling the parts and completing the mechanism ready for operation and use.

In operation, the cylinder or drum is filled to its capacity with a non-compressible liquid, such as glycerin or oil, which liquid is drawn into and forced out from the controlling and regulating cylinders B by the reciprocating movements of the pistons or plungers of such cylinders. The revolving of the shaft F revolves the crank arm E and the revolution of the crank arm operates the pistons or plungers of the several cylinders, and with the revolution of the shaft and crank arm the cylinder or drum will be revolved and the speed at which the cylinder or drum revolves is controlled and governed by the induction and eduction of the liquid into and out from the cylinders. The induction and eduction of the liquid into and out from the cylinders is regulated and controlled by the position of the cut-off rods or stems J with their ports in relation to the ports or passages in the heads or closed ends of the cylinders. With the ports or passages of the cut-off rods or stems and the heads or closed ends of the cylinders in line, leaving the full capacity of the ports or passages for induction and eduction, the speed of the drum or cylinder transmitted thereto from the driving shaft will be the minimum speed, governed by the rapidity with which the liquid is drawn into and educted from the controlling cylinders. An increase of speed is attained by moving the lever or arm H in a direction to move the sleeve C outward, which movement of the sleeve moves the attached ends of the levers or arms I outward or away from the controlling cylinders, moving the inner ends of the arms or levers I inward or toward the controlling cylinders, causing the ports or passages j to pass the ports or passages b more or less, according to the extent of movement of the arms or levers I; and such passing of the ports or passages produces a reduced capacity for the induction and eduction of the liquid, and such reduction in capacity results in an increase of speed for the cylinder or drum, owing to the increased length of time required for drawing the liquid into and educting the liquid from the controlling cylinders. The movement of the arms or levers I to an extent sufficient for the cut-off stems or rods to entirely close the ports or passages b, prevents the passage of the liquid into and out from the cylinders and locks the pistons or plungers against

any reciprocating movement so that the rotation of the cylinder or drum will be coincident with the rotation of the shaft. The rotation of the cylinder or drum revolves the shaft or spindle axially connected to one of its heads and imparts the speed of the cylinder or drum to the shaft or spindle for transmitting power thereto. It will be seen that the speed at which the cylinder or drum is driven is regulated and controlled by the induction and eduction of liquid into and out from the controlling cylinders, and that the rapidity of the induction and eduction of the liquid regulates and controls the reciprocating movement of the pistons or plungers of the controlling cylinders, so that a perfect regulation and control of the power transmitting mechanism is secured by and through the medium of a non-compressible liquid. The non-compressible liquid, owing to its nature, enables the regulation of the speed to be accomplished without any jar or concussion and the liability of injury to the mechanism and the parts operated therefrom or thereby is reduced to a minimum.

The mechanism is exceedingly simple in construction and will be found effectual and reliable for the purpose intended; and by its use the speed can be readily and quickly changed without any danger of causing injury or ill effects to the parts in making the change.

What I claim as new, and desire to secure by Letters Patent, is:

1. A power transmitting mechanism comprising an outer cylinder adapted to contain a non-compressible liquid, a plurality of inner cylinders arranged radially within the outer cylinder, said inner cylinders having outer heads contiguous to the inner surface of the perimeter of said outer cylinder, said heads having ports communicating with the interior of said inner cylinders, said heads also having transverse passages therein communicating with said ports and with the exterior of said inner cylinders, each said cylinders having a transverse hole therethrough in communication with said ports, a slide valve having radial openings therethrough and movably seated in said transverse hole with the said openings normally registering with said ports, a piston in each inner cylinder, a shaft, a crank on said shaft, connecting rods between said crank and pistons, a sleeve slidably seated on said shaft, a lever pivotally connected at one end to said sleeve and at the other end to said slide valve and pivoted intermediately to a bracket, and means connected to said sleeve for moving the same longitudinally of the shaft and thereby controlling the flow of liquid through the slide valve.

2. A power transmitting mechanism comprising an outer cylinder adapted to contain liquid, an inner cylinder closed by a head at one end and disposed parallel with a radial line of the outer cylinder and removably secured to the inner surface of the outer cylinder, said head having a transverse passage therein and having ports communicating with said passage and with the interior of said inner cylinder, a hole through said head intersecting said ports, a cylindrical slide valve in said hole, said slide valve having radially disposed openings therethrough, said openings being adapted to register with said ports, a piston in the inner cylinder, means for actuating the piston, and means for sliding the slide valve.

3. A power transmitting mechanism comprising an outer cylinder adapted to contain liquid, an inner cylinder closed by a head at one end and disposed parallel with a radial line of the outer cylinder and secured to the inner surface of the outer cylinder, said head having ports therethrough communicating with the interior and exterior of said inner cylinder, said head having a hole therethrough intersecting the said ports, a slide valve having openings therein, said slide valve being movably seated within said hole with the openings normally registering with said ports, a piston in said inner cylinder, means for actuating said piston, and means for moving the slide valve for regulating the flow of liquid through the said ports.

4. A power transmitting mechanism comprising an outer cylinder adapted to contain liquid, an inner cylinder closed by a head at one end and removably secured to the inner surface of the outer cylinder, said head having a passage therein and having ports communicating with said passage and with the interior of said inner cylinder, a hole through said head intersecting said ports, a slide valve in said hole, said slide valve having openings therein, said openings being adapted to register with said ports, a piston in the inner cylinder, means for actuating the piston, and means for sliding the slide valve.

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