A. H. SHOEMAKER.

FLUID CLUTCH.

APPLICATION FILED DEC. 12, 1911.

1,034,740.

Patented Aug. 6, 1912

2 SHEETS—SHEET 1.

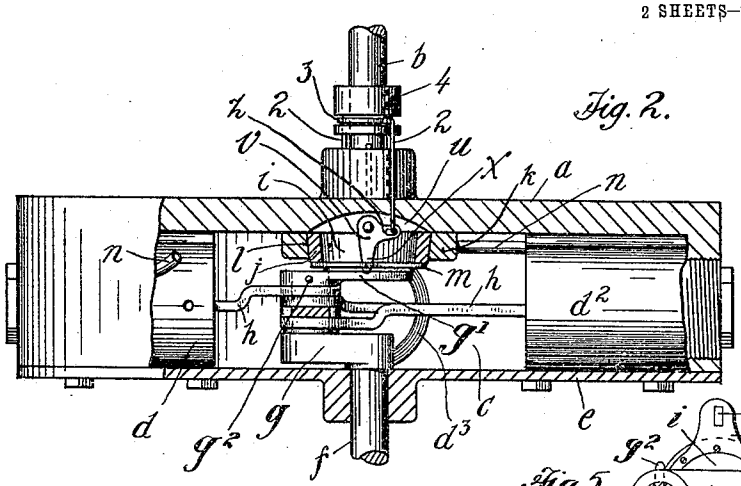

Fig. 2.

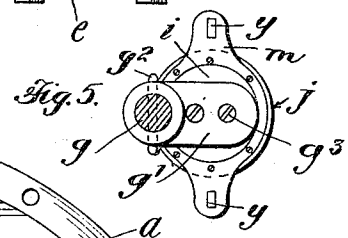

Fig. 5.

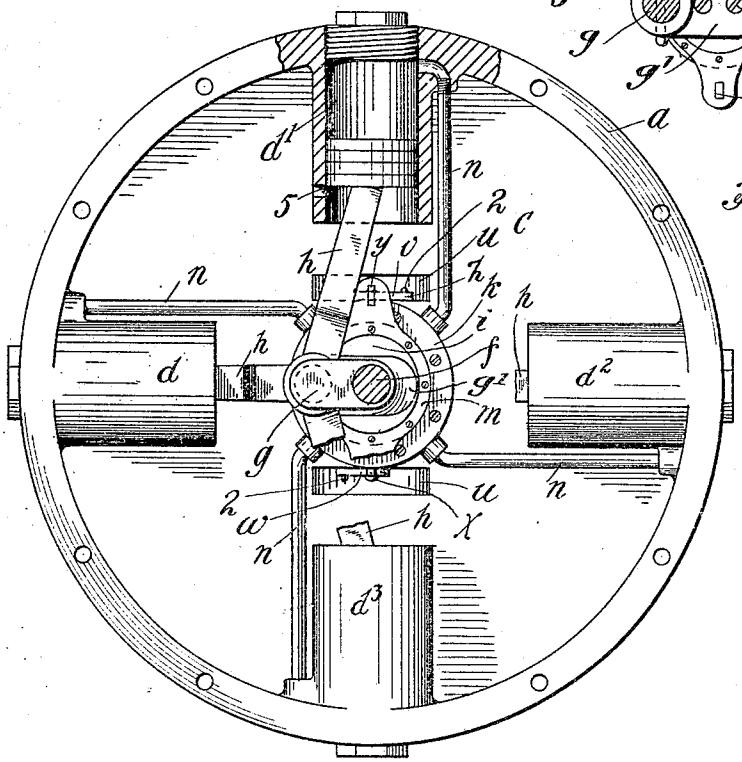

Fig. 1.

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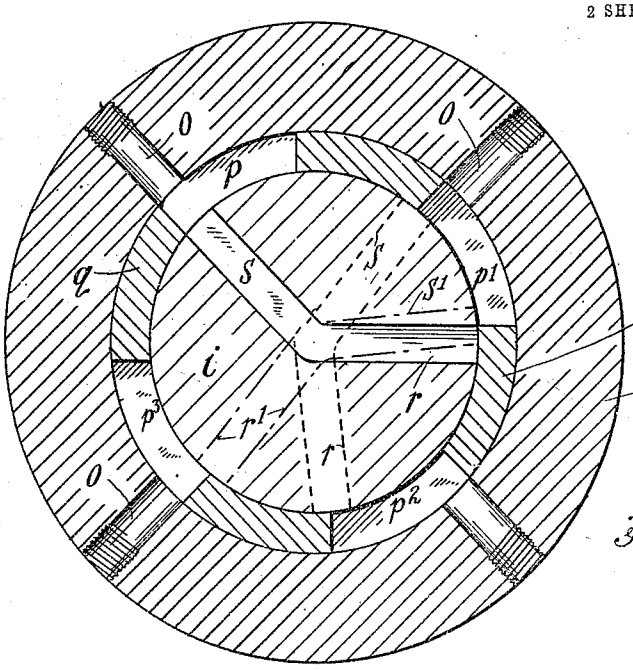
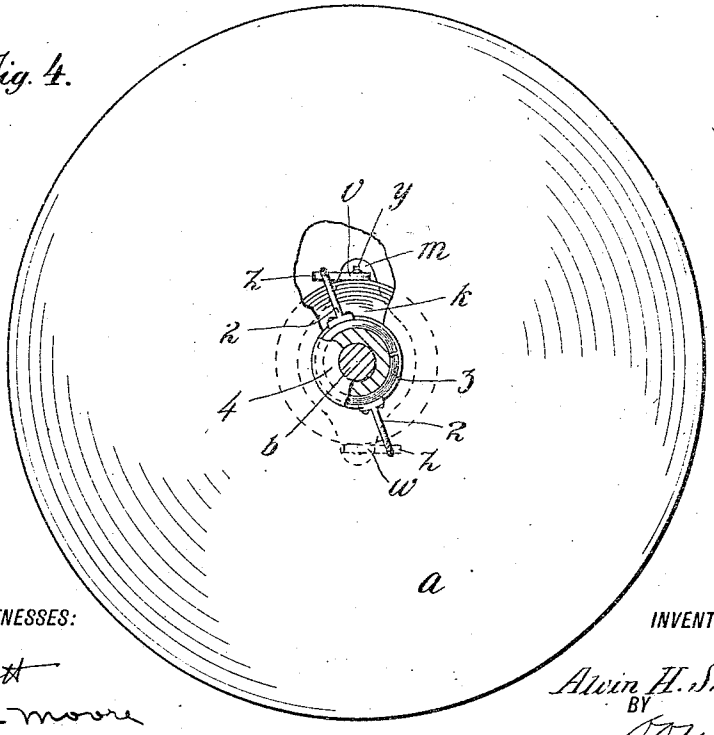


Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

ALVIN H. SHOEMAKER, OF PORTLAND, OREGON, ASSIGNOR OF TWO-THIRDS TO ALBERT CLEVELAND AND E. A. TYROLL AND ONE-THIRD TO J. W. HURLEY, ALL OF PORTLAND, OREGON.

FLUID-CLUTCH.

1,034,740. Specification of Letters Patent. Patented Aug. 6, 1912.

Application filed December 12, 1911. Serial No. 665,393.

To all whom it may concern:

Be it known that I, ALVIN H. SHOEMAKER, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented certain new and useful Improvements in Fluid-Clutches, of which the following is a specification.

My invention relates to means for operatively connecting the engine of a selfpropelled vehicle with the running gear of the vehicle, and is an improvement upon a device, for which I applied for Letters Patent on September 11th, 1911, Serial No. 648,811.

The device I am about to describe shows the general features set forth in said earlier application, the engine fly-wheel, rigidly mounted on the engine shaft, being cup-shaped and supporting a plurality of air cylinders, the pistons of which operatively connect with a crank-pin of the vehicle drive shaft.

The object of the present invention is to connect the air chambers of said cylinders with a centrally located distributing device, by means of which the air-pressure in the several cylinders may be governed at will, thereby varying the speed of the vehicle to suit operating conditions.

The objects and advantages of my invention are readily comprehended by reading the following description in connection with the appended drawings, in which:

Figure 1 is a rear elevation of an engine fly-wheel embodying my invention, Fig. 2 is a corresponding plan view of the device partly in section, Fig. 3 is a sectional rear elevation, on an enlarged scale, of the distributer of my device and is taken substantially on line A—A of Fig. 1, Fig. 4 is a front elevation of the fly-wheel, and Fig. 5 is a detail view of some of the distributer parts shown centrally located in Fig. 1.

Fly-wheel *a* is fixed on engine shaft *b* and made with a concentric chamber *c*, in which air cylinders *d*, d^1, d^2 and d^3 are rigidly mounted. A plate or cap *e* closes the mouth of chamber *c* and serves as a bearing for rear-wheel drive shaft *f*. The latter is made with a crankpin *g*, on which piston rods *h* are rotatably hung.

Rigidly connected with the end of crankpin *g* is a disk *i*, rotatably mounted in a sleeve *j*, which in turn is mounted to rotate in an annular casing *k*, and the latter is fixed on the interior wall of the fly-wheel. Disk *i* and sleeve *j* are in any suitable manner, as by their beveled edges *l*, retained in alinement, and the sleeve is provided with a cover plate *m*, which retains said sleeve in a fixed position relative to the fly-wheel by means of suitable mechanism and for the purpose to be hereinafter described. From the outer end of the air cylinders extend tubes *n*, which terminate in perforations *a* of casing *k*. Perforations *o* are equidistantly spaced, and as I show four cylinders, the perforations are exactly 90 degrees apart. It is immaterial how the crank-pin *g* and disk *i* are connected, so long as they are rigidly combined to act as a unit. The connecting means shown in the drawings, as best shown in Fig. 5, comprises an arm g^1, rigidly fixed on the end of crank-pin *g* by a tapered pin g^2. Said arm is by screws g^3 rigidly secured to the face of disk *i*. It is noticed that the cover plate *m* of sleeve *j* is perforated, and that said disk projects through said perforation.

Sleeve *j* is made with perforations *p*, all of the same length and equal in length to the intermediate portions *q*. Disk *i* is provided with an air-passage comprising two branches *r*, *s*, which diverge radially from the center of the disk at an angle of 135 degrees to each other.

The mechanism thus far described as contained within casing *k* is the distributer of my device. By comparing Fig. 1 with Fig. 3, it is seen that air-passage *r* is positioned parallel with and diametrically opposite crank pin *g*, and that piston rod *h* has forced its piston to the outer end of cylinder *d*.

The fly-wheel rotates in the direction of arrow *t*, while valve-disk *i*, due to the resistance offered by the vehicle wheels, tends to remain stationary, or in order to simplify this description it may be said, that the valve-disk rotates in the opposite direction relative to the fly-wheel. The air in cylinder d^1 is becoming compressed, and this compressed air is forced into perforation p^1. When the air in cylinder d^1 approaches its highest point of compression, simultaneously with the valve-disk reaching the position shown in dotted outline in Fig. 3, a quantity of air rushes through passage *r*, *s*, perforation p^2 and into cylinder d^2, thereby relieving the pressure in cylinder d^1, as the

piston of the latter passes the dead-point. This performance is repeated from cylinder to cylinder as the fly-wheel rotates. As the piston in cylinder d^1 now moves toward the mouth of the cylinder an air expansion gradually takes place, which however is relieved as soon as the valve-disk reaches the position indicated by reference letters r^1, s^1, when air is drawn from cylinder d^3, which at this time is in a state of partial compression.

Sleeve j and cover-plate m, as above stated, are rigidly combined, if therefore said cover-plate is turned in the direction opposite to arrow t perforations o may be entirely closed, so that no air can escape from cylinder to cylinder, and the fly-wheel in that case positively rotates drive shaft f. But by advancing the sleeve to and beyond the position shown in the drawing, the pressure in the cylinders is relieved at a correspondingly advanced moment, until the point is reached where practically no compression takes place, and the engine runs free.

Each cylinder is preferably made with an air-vent 5, so positioned relative to the piston of the cylinders that air is free to enter a cylinder, when the piston reaches the limit of its expansion stroke; and this air, in relieving the expansion at this moment, not only aids in producing a smooth running device, but also, by admitting surplus air, adds to the density of the air in the cylinders, thus increasing the efficiency of my device.

Any suitable means may be employed to oscillate sleeve j, and the mechanism I illustrate is merely embodied in order to present a complete operative device.

On the interior wall of the fly-wheel are cut recesses u, and in these I journal a pair of bell-cranks v, w, the outer ends x of which extend through perforations y of cover-plate m, while their inner ends z are perforated to receive rods 2. The latter are slidably mounted in and extend through the wall of the fly-wheel. The outer ends of said rods are fixed on an annular shoe 3, loosely hung in a groove of a sleeve 4. It is noticed that said bell-cranks are disposed in opposite directions, when therefore sleeve 4 is caused to slide longitudinally on shaft b, the bell-cranks, through the medium of their outer ends x, cause plate m and sleeve j to oscillate for the purpose mentioned.

From the foregoing description it is clear, that my aim is to provide means for distributing the air in the several cylinders, and also to provide means for timing said air distribution, in order that the amount of air pressure may be governed at will, and the speed of the vehicle thereby controlled.

Anyone versed in the art will understand, that various results may be obtained by varying the angular relation between branches r, s of the air passage in valve disk i. By varying the length of perforations p, p^1, p^2 and p^3 of sleeve j I can also arrive at different results. The relative proportions illustrated and described have been found most satisfactory in actual practice, but I wish it understood, that I may change these proportions along the lines suggested, without thereby departing from the principle of my invention.

I claim:

1. In a device of the character described, the combination with an engine shaft, a fly-wheel and a vehicle drive shaft; of a series of radially disposed air cylinders integral with said fly-wheel; a series of pistons, said pistons operatively connected with a crank of said vehicle drive shaft; a centrally located air distributer; air-tubes leading from the outer end of said cylinders to perforations of said distributer; said distributer provided with a rotatably mounted valve-disk, said valve-disk rigidly connected with said vehicle drive shaft and provided with an air-passage by means of which air is distributed to the several cylinders; and manually operated means for timing said distributer.

2. In a device of the character described, the combination with an engine shaft and a vehicle drive shaft in continued alinement with said engine shaft; of a series of radially disposed air-cylinders driven by said shaft; a series of pistons, said pistons operatively connected with a crank of said vehicle drive shaft; a centrally located distributer; air-tubes leading from the outer end of the cylinders to perforations of the distributer; said distributer provided with a valve-disk rotatably mounted in the distributer, said valve-disk rigidly connected with said vehicle drive shaft and provided with means for distributing the air in the several cylinders; and manually operated means for timing said distributer.

3. In a device of the character described, the combination with an engine shaft, a fly-wheel and a vehicle drive shaft in continued alinement with said engine shaft; of a series of radially disposed air-cylinders driven by said engine shaft; a series of pistons, said pistons operatively connected with a crank of said vehicle drive shaft; a centrally located air-distributer; air-tubes leading from the outer end of said cylinders to perforations of said distributer; said distributer comprising an annular casing driven by said engine shaft, and a valve disk rotatably mounted in said casing, said valve disk rigidly connected with the vehicle drive shaft and provided with an air-passage by means of which the air is distributed in the several cylinders; and manually operated means for timing said distributer.

4. In a device of the character described,

the combination with an engine shaft, a flywheel and a vehicle drive shaft in continued alinement with said engine shaft; of a series of radially disposed cylinders driven by said engine shaft; a series of pistons operatively connected with a crank of the vehicle drive shaft; a centrally located distributer; air-tubes leading from the outer end of said cylinders to perforations of said distributer; said distributer comprising an annular casing driven by the engine shaft, an annular sleeve rotatably mounted in said casing, said sleeve provided with ports adapted to register with perforations of said casing, and a valve disk rotatably mounted in said sleeve, said valve disk rigidly connected with the vehicle drive shaft and provided with an air-passage by means of which the air is distributed in the several cylinders; and means for oscillating said sleeve relative to said casing for the purpose of timing the air distribution.

5. In a device of the character described, the combination with an engine shaft and a vehicle drive shaft in continued alinement with said engine shaft; of a series of radially disposed air cylinders driven by said engine shaft; a series of pistons operatively connected with a crank of said vehicle drive shaft; a centrally located air-distributer; air-tubes leading from the outer end of said air-cylinders to perforations of said distributer; said distributer provided with a valve disk rotatably mounted in the distributer, said valve disk rigidly connected with said vehicle drive shaft and provided with means for distributing the air in the several cylinders; manually operated means for timing said distributer; and an air-vent in each cylinder adapted to relieve the partial vacuum when a piston reaches the mouth of a cylinder.

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