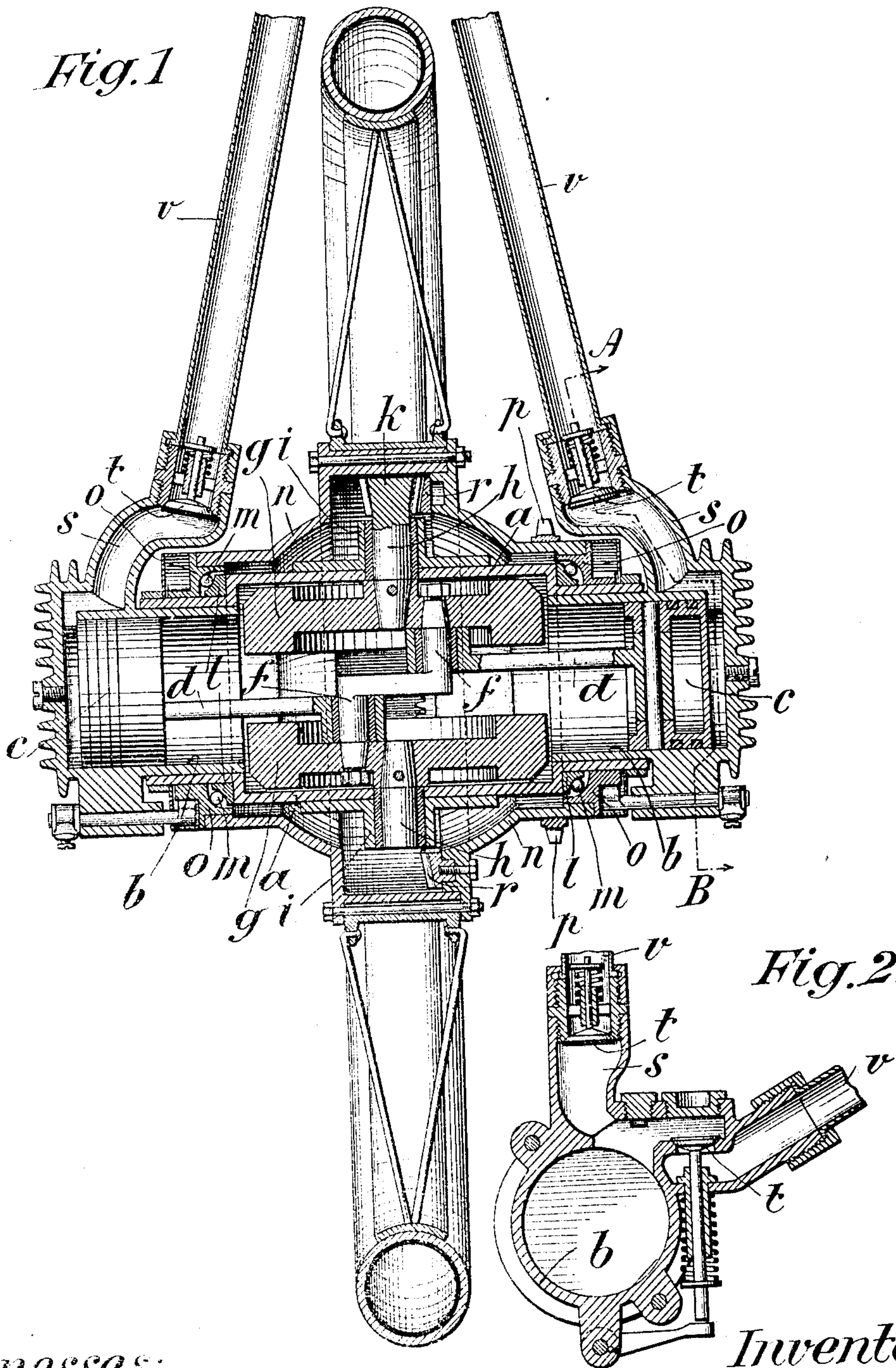


E. BÜTIKOFER.  
MOTOR CYCLE.

APPLICATION FILED FEB. 9, 1906.



Witnesses:

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# UNITED STATES PATENT OFFICE.

EDUARD BÜTIKOFER, OF BIEL, SWITZERLAND.

## MOTOR-CYCLE.

No. 818,609.

Specification of Letters Patent.

Patented April 24, 1906.

Application filed February 9, 1906. Serial No. 300,328.

*To all whom it may concern:*

Be it known that I, EDUARD BÜTIKOFER, a citizen of the Republic of Switzerland, residing at Biel, Switzerland, have invented new and useful Improvements in Motor-Cycles, of which the following is a specification.

My invention relates to improvements in motor-cycles, and more especially to improvements in the driving mechanism for motor-cycles; and it consists, essentially, of the construction, arrangement, and coöperation of parts, as will hereinafter be fully described with reference to the accompanying drawings, of which—

Figure 1 represents a horizontal section through the driving-wheel and the actuating mechanism. Fig. 2 is a sectional view on line A B of Fig. 1.

There have been repeated attempts to arrange in motor-cycles within the driving-wheel one or more cylinder-motors, in the latter case with cylinders the pistons of which operate in opposite directions, and there is already known a construction in which a motor is arranged within the hub of the driving-wheel, the cylinder-axis of which coincides with the rotary axis of the driving-wheel.

The present invention has reference to a special form of construction of driving-wheel with internally-arranged driving mechanism. In this construction two opposed motors with two fly-wheels are so arranged within the fixed driving-wheel axle, which at the same time serves as motor-casing, that the common middle plane of the motors coincides with the middle plane of the axle of the driving-wheel, and the motors are disposed symmetrical to the plane of motion of the driving-wheel, the middle line of the crank-shaft coinciding with the plane of motion of the driving-wheel and the cylinders being arranged symmetrically to each other at either side and the symmetrically-disposed frame-tubing being used for conducting the gases.

In the drawings, *a* is the rigid axle, formed by the casing of the motor, in the ends of which latter the cylinders *b* are located. In these cylinders reciprocate the two pistons *c*, which are connected, by means of the pitmen *d*, to the crank-shaft *f*, cranked to one hundred and eighty degrees and directly secured to the fly-wheels *g*. The trunnions *h* of these fly-wheels are journaled in bearings *i* of the casing *a*. One of these trunnions *h*

carries a bevel-wheel *k* for transmitting the crank motion.

Upon the motor-casing *a* is journaled, by means of the ball-bearings *l m o*, the two-part hub *n* of the driving-wheel, which serves at the same time as lubricating box for all moving parts of the driving mechanism requiring lubrication. Internally there is secured on the hub *n* a bevel-wheel *r*, meshing with the bevel-wheel *k*, for transmitting the crank action to the driving-wheel. There is further secured to the hub *n* the sprocket-wheel *p*, which is connected in well-known manner by chain to the foot-pedal axle. The cylinders *b* are provided for the induction and education of the power medium with valve-chambers *s*, containing the valves *t*, which are directly connected to the frame-tubing *v* in suitable manner, whereby the cycle-frame tubing is used for the conducting of the gases.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a motor-cycle, in combination, two motors oppositely disposed within the driving-wheel, the common middle plane of which coincides with the axis of rotation of the driving-wheel, a crank-shaft common to both said motors in the middle plane of the driving-wheel, and two fly-wheels within the hub of the driving-wheels, substantially as described.

2. In a motor-cycle, in combination, a fixed hollow driving-wheel axle, and motor-cylinders, one at either end of said hollow axle, substantially as described.

3. In a motor-cycle, in combination, a fixed hollow driving-wheel axle, a motor-cylinder at either end of said hollow axle, pistons therein, pitmen, and a crank-shaft cranked to one hundred and eighty degrees, substantially as described.

4. In a motor-cycle, in combination, a fixed hollow driving-wheel axle, a motor-cylinder at either end thereof, pistons therein, a shaft cranked to one hundred and eighty degrees, pitmen connecting said pistons to said crank-shaft, and a fly-wheel at either end of said crank-shaft, substantially as described.

5. In a motor-cycle in combination, a fixed hollow driving-wheel axle, a motor-cylinder at either end thereof, pistons therein, a shaft cranked to one hundred and eighty degrees, pitmen connecting said pistons to said crank-



shaft, a fly-wheel at either end of said crank-shaft, trunnions on said fly-wheels, and bearings in said hollow driving-wheel axle for journaling said trunnions, substantially as set forth.

6. In a motor-cycle in combination, a fixed hollow driving-wheel axle, a motor-cylinder at either end thereof, pistons therein, a shaft cranked to one hundred and eighty degrees, pitmen connecting said pistons to said crank-shaft, a fly-wheel at either end of said crank-shaft, trunnions on said fly-wheels, bearings in said hollow driving-wheel axle for journaling said trunnions, and a bevel-wheel on one of said trunnions outside of said fixed hollow axle, substantially as described.

7. In a motor-cycle in combination, a fixed hollow driving-wheel axle, a motor-cylinder at either end thereof, pistons therein, a shaft cranked to one hundred and eighty degrees, pitmen connecting said pistons to said crank-shaft, a fly-wheel at either end of said crank-shaft, trunnions on said fly-wheels, bearings in said hollow driving-wheel axle for journaling said trunnions, a bevel-wheel on one of said trunnions outside of said fixed hollow axle, a two-part casing surrounding said driving-wheel axle and rigidly secured to the driving-wheel, ball-bearings between said fixed axle and said two-part casing, and a bevel-wheel on said casing meshing with the first said bevel-wheel, substantially as described.

8. In a motor-cycle in combination, a fixed hollow driving-wheel axle, a motor-cylinder at either end thereof, pistons therein, a shaft

cranked to one hundred and eighty degrees, pitmen connecting said pistons to said crank-shaft, a fly-wheel at either end of said crank-shaft, trunnions on said fly-wheels, bearings in said hollow driving-wheel axle for journaling said trunnions, a bevel-wheel on one of said trunnions outside of said fixed hollow axle, a two-part casing surrounding said driving-wheel axle and rigidly secured to the driving-wheel, ball-bearings between said fixed axle and said two-part casing, a bevel-wheel on said casing meshing with the first said bevel-wheel, and a sprocket-wheel rigidly secured to said two-part casing, substantially as described.

9. In a motor-cycle, in combination a fixed hollow driving-wheel axle, a motor-cylinder at either end of said axle, and symmetrically-disposed gas-conducting passages, substantially as described.

10. In a motor-cycle in combination, a fixed hollow driving-wheel axle, a motor-cylinder at either end of said axle, symmetrically-disposed gas-conducting passages, valve-chambers in communication with said gas-passages, valves therein, and means for securing said valve-chambers directly to the hollow frame-tubing, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDUARD BÜTIKOFER.

Witnesses:

E. G. COY,

T. G. SCHESLER.