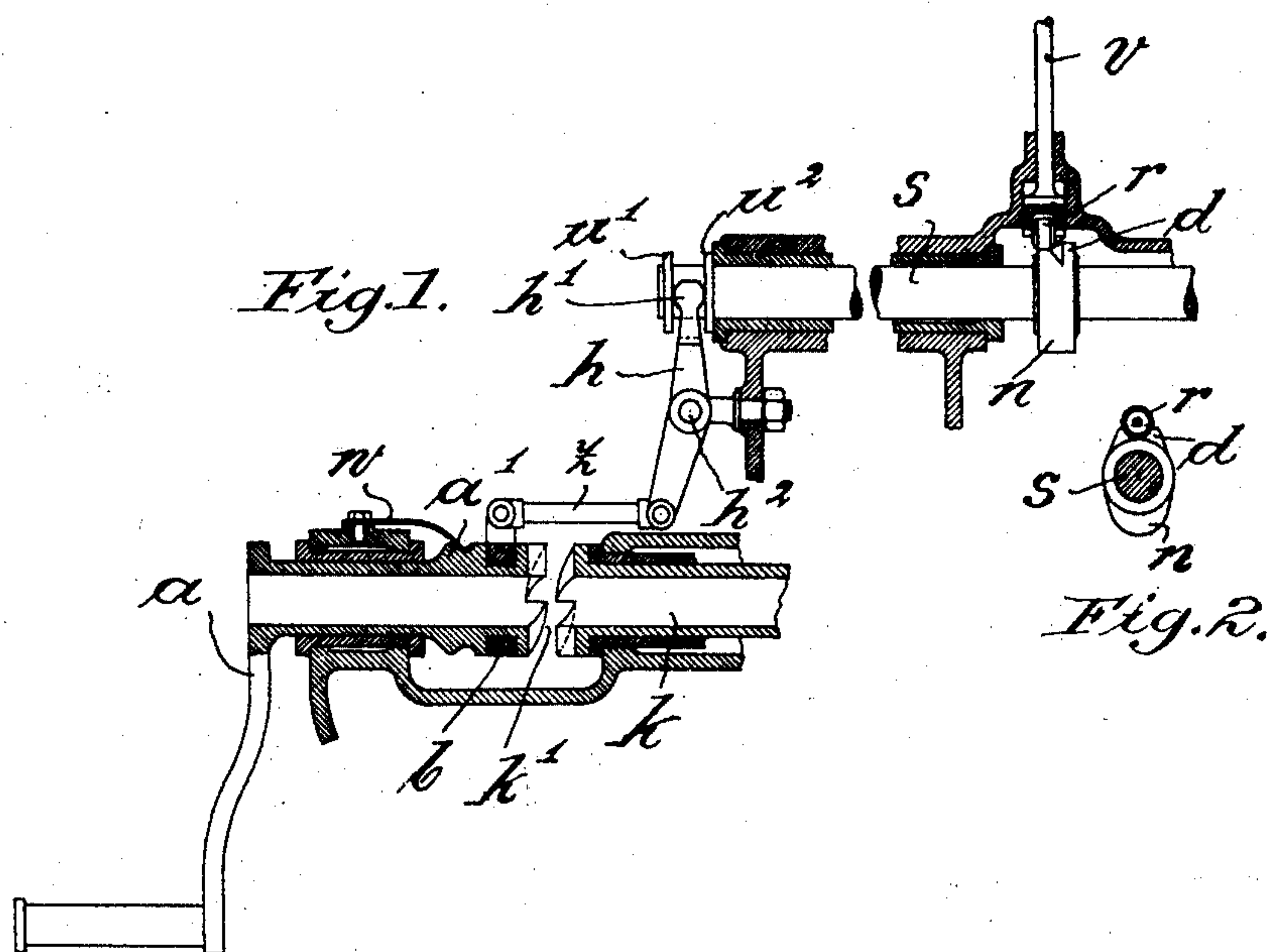


No. 826,903.

PATENTED JULY 24, 1906.

C. A. VON SODEN-FRAUNHOFEN.  
STARTING DEVICE FOR EXPLOSION MOTORS.

APPLICATION FILED DEC. 10, 1904.



Witnesses:

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# UNITED STATES PATENT OFFICE.

CARL ALFRED VON SODEN-FRAUNHOFEN, OF STUTTGART, GERMANY,  
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## STARTING DEVICE FOR EXPLOSION-MOTORS.

No. 826,903.

Specification of Letters Patent.

Patented July 24, 1906.

Application filed December 10, 1904. Serial No. 236,331.

*To all whom it may concern:*

Be it known that I, CARL ALFRED VON SODEN-FRAUNHOFEN, a subject of the King of Bavaria, and a resident of Stuttgart, in the Kingdom of Württemberg, German Empire, have invented certain new and useful Improvements in Starting Devices for Explosion-Motors, of which the following is an exact specification.

My invention relates to improvements in and connected with means for starting internal-combustion engines such as are used for motor-cars, motor-launches, and for other purposes.

As this operation requires a comparatively large expenditure of manual force on a starting-handle in consequence of the high compression, it has recently become the practice to reduce the compression as much as possible at starting by opening the induction or the exhaust valves for a short time during the compression-stroke.

Now according to this invention means are employed for automatically opening the induction or exhaust valves enough to reduce the amount of compression as much as is advisable by causing the movement of the starting-handle for the purpose of engaging the clutch on the motor-shaft to operate means for causing the valves, or one of them, to open and to be open sufficiently while compression is taking place until the motor has properly started, whereupon the handle is automatically forced out of engagement with the motor-shaft and the compression is effected in the normal manner.

In order to make my invention more clear, I refer to the accompanying drawings, in which—

Figure 1 shows a convenient constructional form of my invention, partly in section. Fig. 2 is a side view of a cam-disk used.

In the drawings, *s* is a cam-shaft.

*k* is the motor-shaft.

*a* is the starting-handle, so carried by its bearing as to be somewhat axially movable.

*k'* represents teeth at the ends of *k* and *a*, forming a clutch for coupling the handle-boss *a'* to the motor-shaft *k*.

*z* is a connecting-rod pivotally connected to the ring *b*, carried by the boss *a'*.

*h* is a second lever, one end of which is journaled to the connecting-link *z*, whereas the

other end of lever *h* enters between the rings *u'* and *u''* of the shaft *s*. The lever *h* is pivotally mounted upon the stationary stud *h''*.

*n* is a cam-disk secured to shaft *s*, and provided with a projection *d*.

*v* is a valve-rod to which an induction or an exhaust valve is connected.

*r* is a roller fastened to the lower end of the rod *v*.

*w* is a spring keeping the starting-handle *a* or clutch *k'* disengaged.

The operation is as follows: If the explosion-engine is to be started, the starting-handle *a* is rotated and axially moved inward, so as to engage the clutch *k'*, thereby connecting the motor-shaft *k* to the handle *a*. By doing so the connecting-rods *z* and *h* are so moved that the upper end *h'* of the lever *h* is moved, in the device shown, to the left, thereby axially moving the cam-shaft *s* to the left and the roller *r* upon the projection *d*. The valve-rod is now somewhat raised, thereby keeping open the valve connected thereto and diminishing or avoiding the compression while starting the engine. If the engine has started, the clutch *k'* automatically disengages and the starting-handle is moved to the left, thereby axially moving the cam-shaft to the right, so that the roller *r* is brought out of the range of the projection *d*. The roller *r* now moving upon the left-hand part of the cam-disk *n* thereby actuates the valve-rod *v* and the valve connected thereto in a normal manner.

Having thus fully described the nature of my invention, what I desire to secure by Letters Patent of the United States is—

1. In a starting device for explosion-engines, the combination with an axially-movable starting-handle, of a cam having a projection, a cam-shaft carrying said cam, means for axially moving both the handle and said cam-shaft, a valve-rod, a roller provided at said rod and traveling upon said cam and engaging with said projection while starting the motor, thereby opening the valve connected to the rod and reducing the compression, substantially as described and for the purpose set forth.

2. In a starting device for explosion-engines, the combination with an axially-movable starting-handle, of a cam having a projection, a movable cam-shaft carrying said



cam, a double-armed lever engaging with said handle and movable cam-shaft so as to axially move the latter, a valve-rod, a roller provided on said rod and traveling upon this  
5 cam and engaging with said projection while starting the motor, thereby opening the valve connected to the rod and reducing the compression, substantially as described and for the purpose set forth.

10 3. In a starting device for explosion-engines, the combination with an axially-movable starting-handle of an engine-shaft, clutching means connecting said handle and the engine-shaft while starting, a cam having  
15 a projection, a movable cam-shaft carrying

said cam, a double-armed lever engaging with said handle and cam-shaft, so as to axially move the latter, a valve-rod, a roller provided on said rod and traveling upon this cam and engaging with said projection while  
2 starting the motor, thereby opening the valve connected to the rod and reducing the compression, substantially as described and for the purpose set forth.

In witness whereof I have hereunto set my  
hand in the presence of two witnesses.

CARL ALFRED VON SODEN-FRAUNHOFEN.

Witnesses:

ERNST ENTLERMANN,

FRIEDRICH LANG.