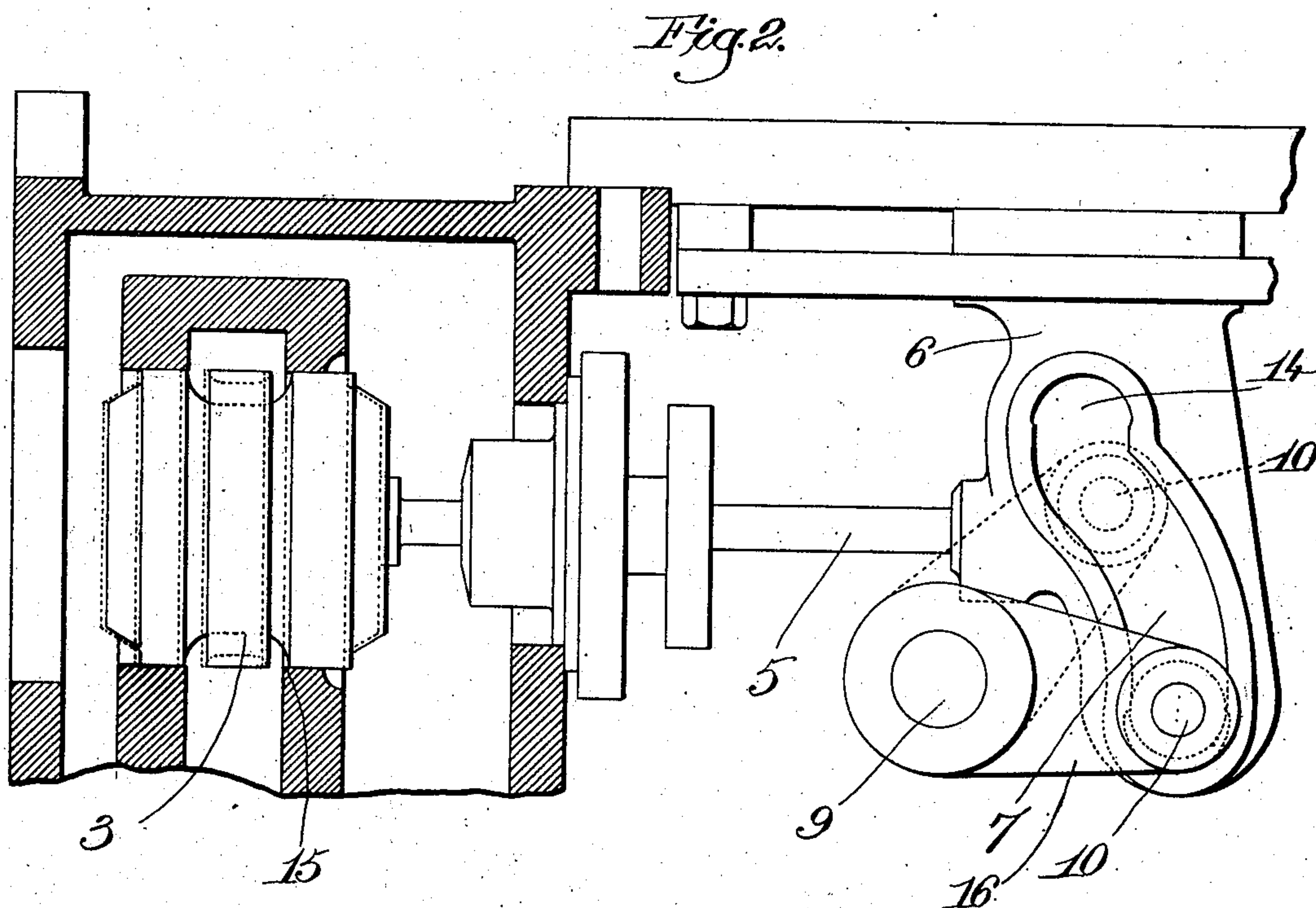
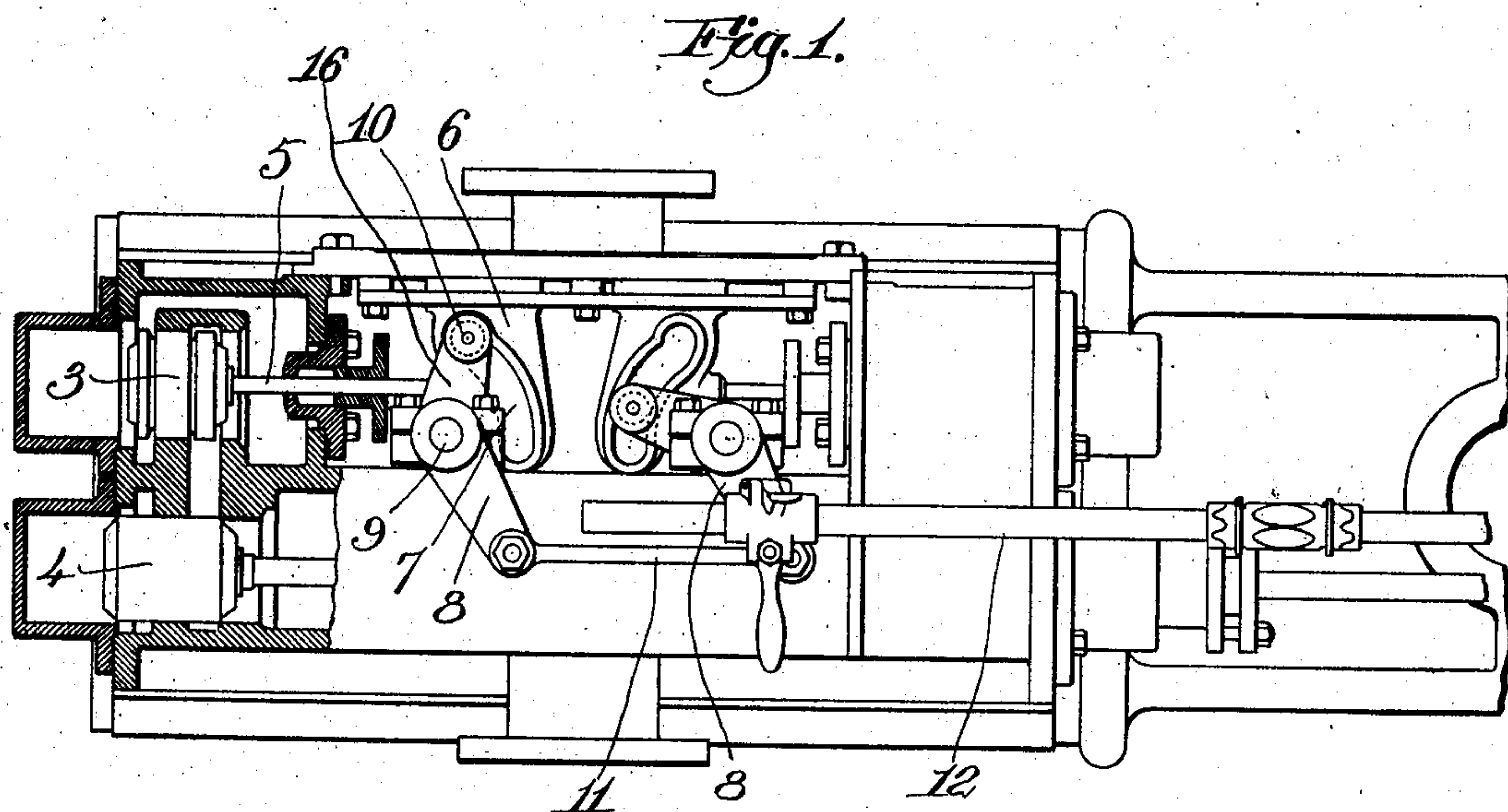


No. 827,433.

PATENTED JULY 31, 1906.

F. FOSDICK.  
STEAM ENGINE VALVE MECHANISM.  
APPLICATION FILED JAN. 24, 1906.



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# UNITED STATES PATENT OFFICE.

FREDERICK FOSDICK, OF FITCHBURG, MASSACHUSETTS.

## STEAM-ENGINE VALVE MECHANISM.

No. 827,433.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed January 24, 1906. Serial No. 297,556.

*To all whom it may concern:*

Be it known that I, FREDERICK FOSDICK, a citizen of the United States, residing at Fitchburg, county of Worcester, and State of Massachusetts, have invented an Improvement in Steam-Engine Valve Mechanism, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

This invention relates to steam-engine valve mechanisms, and especially to the valve mechanism of the type shown in my Patent No. 569,628, dated October 20, 1896. The valve mechanism shown in said patent comprises a reciprocating cam connected to the valve proper and provided with a cam-surface which is acted upon by an oscillating arm carrying a pin. The cam-surface in the reciprocating cam is in the form of a cam-slot, which for the greater part of its length is concentric with the axis of motion of the oscillating arm and which terminates at one end in an offset portion that is engaged by the pin on the oscillating arm to give the valve its motion. With this construction the valve remains at rest during the time that the pin on the oscillating arm is moving through the concentric portion of the slot, and the movement of the valve commences and continues while the pin on said arm is in engagement with the offset portion of said slot. I have found that when a valve mechanism such as shown and described in said patent is used in a medium or high speed engine where the valve makes a very quick stroke the changing of the valve from its condition of rest to its sliding movement is accomplished in so short a time that there is considerable shock or jar developed in the running of the engine, this shock or jar being especially apparent in large engines running at high speed and having comparatively heavy valves. In order to avoid this shock and jar so that the valve will be gradually started and gradually brought to its condition of rest, I have provided a special construction of cam adapted to keep the valve moving throughout the entire movement of the rocking arm, the movement of the valve during the first part of the movement of the rocking arm being very slight, but sufficient to overcome its inertia, so that when the arm engages the offset portion of the cam to give the valve its movement the valve is started from a moving condition. One convenient

way of making the cam-surface to accomplish this end is to make the greater part thereof sufficiently eccentric so that the valve will have a slight initial movement before the pin on the rocking arm engages the offset portion of the cam-slot.

In the drawings, Figure 1 is a side view of one cylinder of an engine having my improved valve mechanism applied thereto, part of the valve-chest being broken out to better show the construction; and Fig. 2 is an enlarged view of one of the sliding cams.

In the drawings, 3 designates the steam-valve, and 4 the exhaust-valve. The steam-valve has connected thereto a valve-stem 5, which is rigid with a sliding actuator 6 in the form of a cam provided with a cam-slot 7.

9 designates a rock-shaft having one arm 16.

8 is a rocking or oscillating arm provided with a pin 10, which engages the cam-slot 7 and another arm 8, which is connected by a link 11 with the corresponding arm 8 for the valve at the other end of the cylinder. These two rocking arms 8 are suitably connected to a valve-rod 12, which is actuated by the usual eccentric mechanism for operating the valves.

The parts thus far described are similar in their construction and operation to the corresponding parts in the above-mentioned patent. In said patent, however, the cam-slot 7 is for the greater portion of its length concentric with the rock-shaft 9 and at its upper end is provided with an offset portion. With this construction during the time that the pin 10 of the oscillating arm is moving in the concentric portion of the slot the valve remains at rest, said valve receiving motion only when said pin engages the offset portion of the cam-slot. Where the mechanism such as shown in the above-mentioned patent is used in medium-speed or high-speed engines, the valve is suddenly started from a condition of rest at the time when the pin 10 passes from the concentric to the offset portion of the slot, this sudden starting and stopping of the valve occasioning more or less undesirable shock and jar. To avoid this, I make the slot 7 for the greater portion of its length slightly eccentric to the rock-shaft 9, as best seen in Fig. 2, the remaining portion 14 of the slot being offset, as in the former patent.

The eccentric portion of the slot is that in which the pin 10 travels in moving from the



full-line to the dotted-line position, Fig. 2, this eccentricity being such that in moving from the full to the dotted line position the cam 6, and consequently the valve 3, is moved slightly toward the left, as shown in dotted lines, Fig. 2. When, therefore, the pin 10 enters the offset portion 14 of the slot, thereby to give the valve its stroke, said valve is already moving and the change from the slow initial movement to the quick working stroke of the valve may be accomplished smoothly, evenly, and without any shock or jar.

In order that the initial movement which the valve gets while the oscillating arm is moving from the full to the dotted line position may not result in opening the valve too wide or sooner than desired, I construct said valve with sufficient lap, as shown at 15, to counterbalance this initial movement, so that said initial movement merely results in covering the lap of the valve and in putting it in the same position relative to the steam-ports when the pin 10 is in the dotted-line position, Fig. 2, as said valve is in its neutral position in the above-mentioned patent.

I have found that by constructing valve mechanisms as above described large valves of high-speed engines may be operated evenly and smoothly and with entire absence of all detrimental jar and shock occasioned

by the sudden starting and stopping of the valves.

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

1. In a valve mechanism, a valve, a sliding cam connected thereto and having a cam-slot, and an oscillating arm having a pin engaging said slot, said slot for the greater portion of its extent being slightly eccentric to the pivot of said rocking arm and provided at one end with an offset portion.

2. In a valve mechanism, a valve, a reciprocating actuator connected thereto, an oscillating arm, and connections between said arm and the actuator to give the latter a slow initial movement sufficiently to partially overcome the inertia thereof and of the valve without opening the latter during the first part of the movement of the arm, and a quick extended movement to open the valve during the last part of the movement of said arm.

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

FREDERICK FOSDICK.

Witnesses:

W. A. ROBBINS,  
W. IVAN HARRISON.