

# SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. XXXII.—No. 2.]  
[NEW SERIES.]

NEW YORK, JANUARY 9, 1875.

[\$3.20 per Annum,  
Postage Prepaid.]

## THE BUCKEYE AUTOMATIC ENGINE.

The accompanying engravings represent an improved automatic cut-off engine, built by the Buckeye Engine Company, Salem, Columbiana county, Ohio. The manufacturers claim for this machine that it satisfies the conditions necessary for the highest attainable economy in the use of steam, and, at the same time, that it is so simple in construction as to be but a trifle more expensive than an equally well designed throttling engine.

The slide valve, shown in section in Fig. 3, is in one sense a small moving steam chest; the live steam enters its interior through circular openings in its back or cover, and thence passes into the cylinder, whose ports near its ends are alternately brought to coincide with the cylinder ports.

The exhaust takes place at the end of the valve into the ends of the chest, thence through ample passages into the exhaust pipe. The tortuous exhaust passage, involved in the use of the common slide valve, is thus avoided. As a result, the indicator cards show a remarkable freedom from back pressure, even at high piston speed, as will be seen from the diagram, Fig. 4. The data forwarded to us in connection with this card are: Cylinder 12x20, speed 160 revolutions; scale of indicator 48 lbs. per inch; steam pressure, per gage, 80 lbs.; clearance  $2\frac{1}{2}$  per cent; atmosphere 14 lbs.; mean calculated effective pressure, 30 $\frac{1}{4}$  lbs.; horse power, 55.23; and water per horse power per hour, 18.52. The reader, from this, can make his own deductions as to the operation of the valves.

with proper strength of material, thus considerably reducing the clearance or waste room.

To the openings in the back of the valve are fitted steam metal self-packing rings, which serve the purpose of insuring a steamtight connection between the interior of the valve and the live steam chamber in the back of the chest. The area

of the cut-off eccentric is effected by means of its connection with two weighted levers contained in a circular case on the engine shaft. The outward movements of these levers advance the eccentric forward on the shaft, and two well tempered cast steel wire coil springs furnish the centripetal force which returns them when the speed slackens. It is claimed

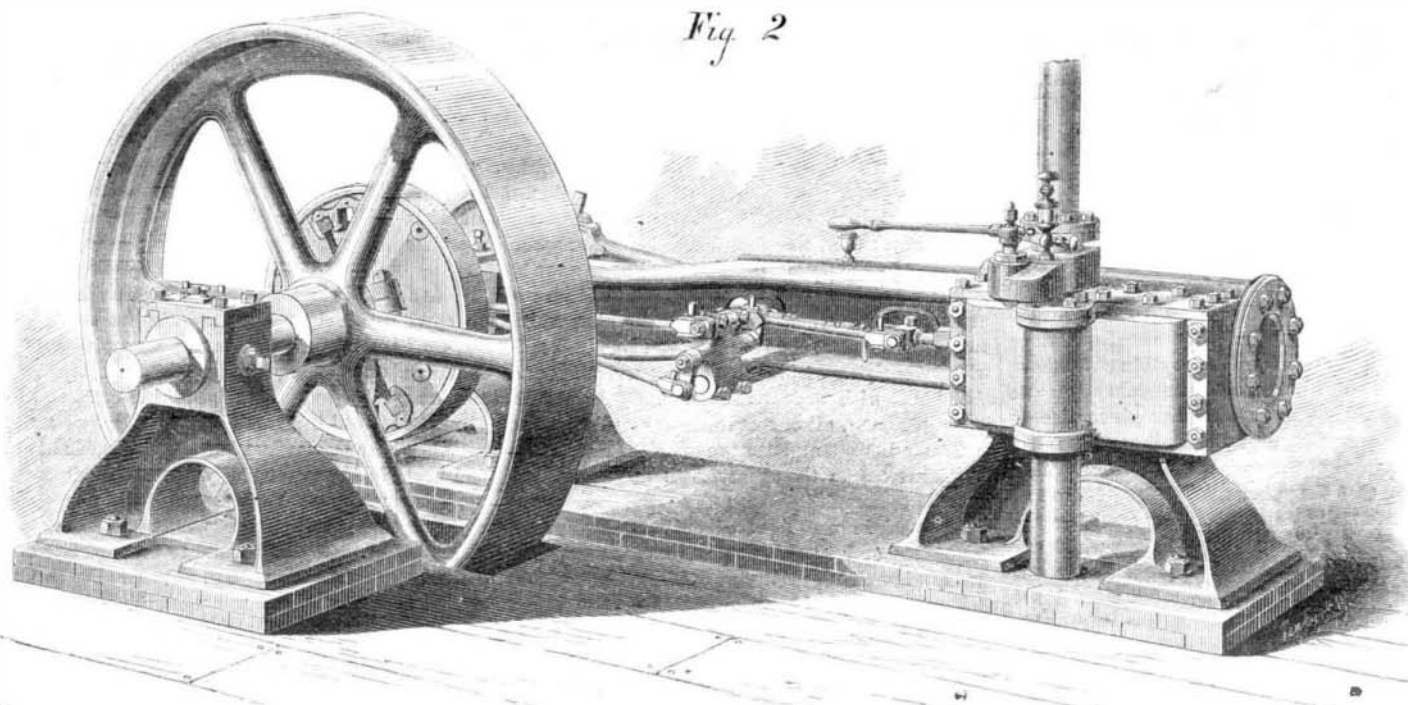
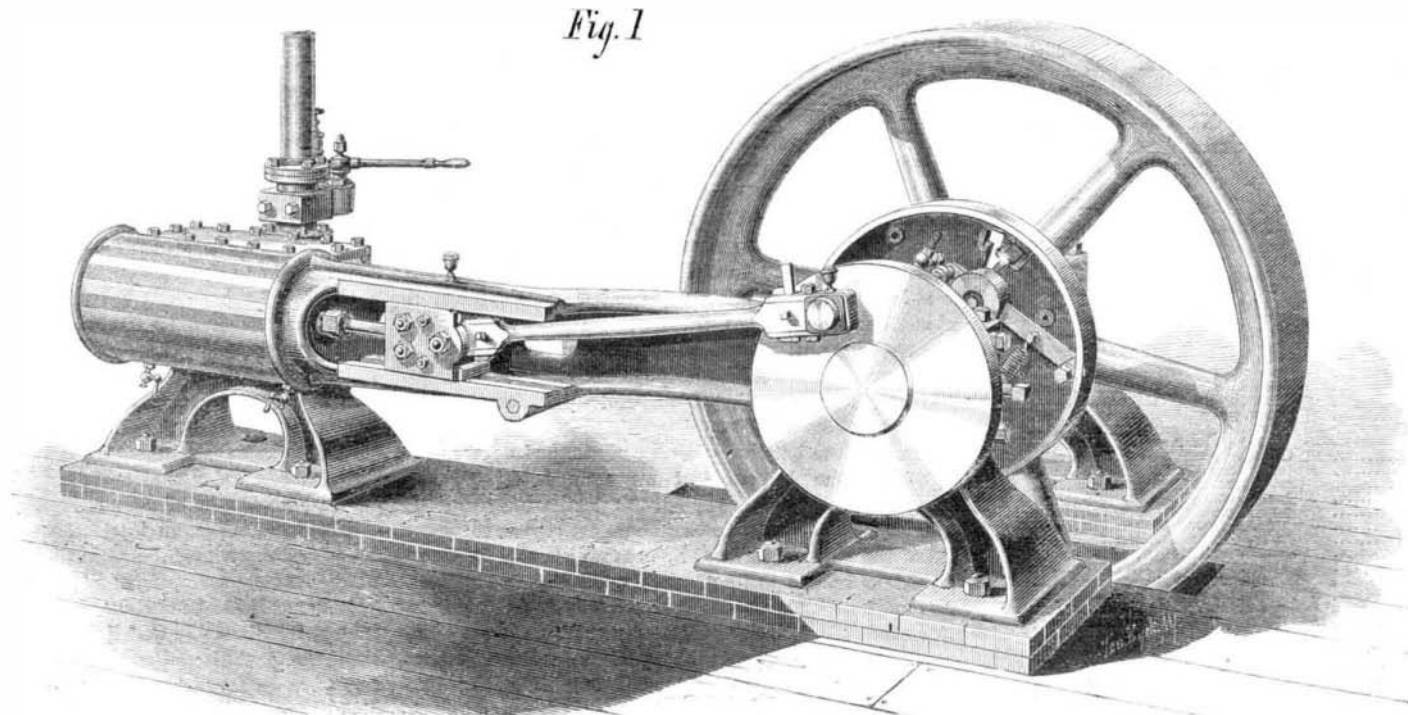
that the effect of this arrangement is to place the sensitiveness of the governor so far under the control of the engineer that he may, by varying the tension of the springs, adapt it to the most widely varying characters of resistance. For instance, in flouring mills, factories, etc., which are not subjected to any very sudden variations of load, so great a uniformity of speed can be obtained that the variation due to ordinary changes of load and pressure of steam almost defies detection.

Saw mills, rolling mills, etc., which are subjected to very sudden and extreme changes of resistance, will require a slightly different tension to give the most satisfactory results.

We are also informed that the friction of the cut-off valve and gear neutralizes the effect of friction of the joints in the governor, and the result is as high a degree of sensitiveness to minute changes, of load and steam pressure, as though all parts were absolutely frictionless.

All the wearing parts are made of the best material; the wrist pins, rock shaft, etc., are of cast steel, and the connecting rod boxes are of the best machine brass and Babbitt's metal. The wearing surfaces and dimensions of shaft, wrist, etc., are proportionally equal to those of the most approved class of engines.

The same manufacturers also build throttling engines of



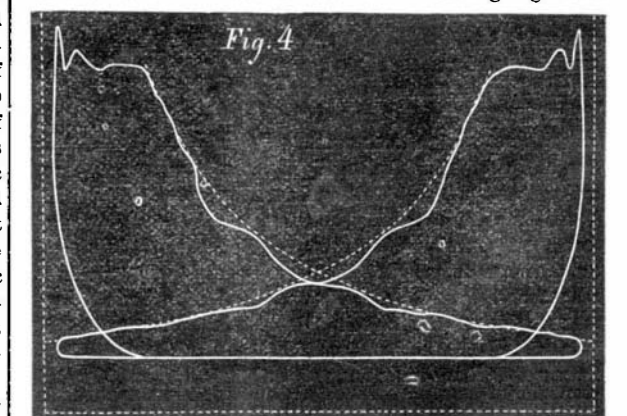
## THE BUCKEYE ENGINE COMPANY'S AUTOMATIC ENGINE.

of these openings is made just sufficient to hold the valve to its seat, hence it is as nearly balanced as is practicable or desirable. As the valve chest contains only exhaust steam, the engines may be run with the chest lid removed, and any leakage readily detected. The cut-off valve works inside of the main valve, and alternately closes the ports leading to the cylinder. The fixed eccentric operates the main valve, and an adjustable one operates the cut-off valve through the medium of gearing. A small rock shaft, which forms a part of the latter, works in a bearing in the rock arm belonging to the main valve gear and moving with it. The movement of the cut-off valve, relatively to its seat in the main valve, is thus, both as to time and extent, just what its eccentric would produce if the valve worked in a stationary seat, and was attached directly to said eccentric. This arrangement will be clearly seen in Fig. 2, and the general aspect of the engine is shown in the front view, Fig. 1. The eccentric rod of the main valve gear works horizontally, while the cut-off eccentric rod inclines downward, so that its attachment to its rocker arm may be on a level, or nearly so, with the center line of the main rock shaft.

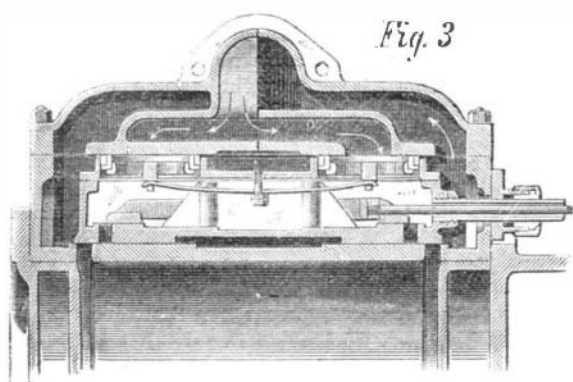
The stem of the cut-off valve passes through the hollow stem of the main valve, and is connected to an upright arm on the cut-off rock shaft, on the end opposite to that to which the eccentric rod is attached. The automatic adjustment of

parts are made of the best material; the wrist pins, rock shaft, etc., are of cast steel, and the connecting rod boxes are of the best machine brass and Babbitt's metal. The wearing surfaces and dimensions of shaft, wrist, etc., are proportionally equal to those of the most approved class of engines.

The same manufacturers also build throttling engines of



like design and finish, and various other styles, adapted for rapid speed and special work. Address, for further information, the Buckeye Engine Company, as above.



The absence of exhaust passages in the cylinder and valve gives the additional advantage that the face of the valves may be as close to the bore of the cylinder as is consistent