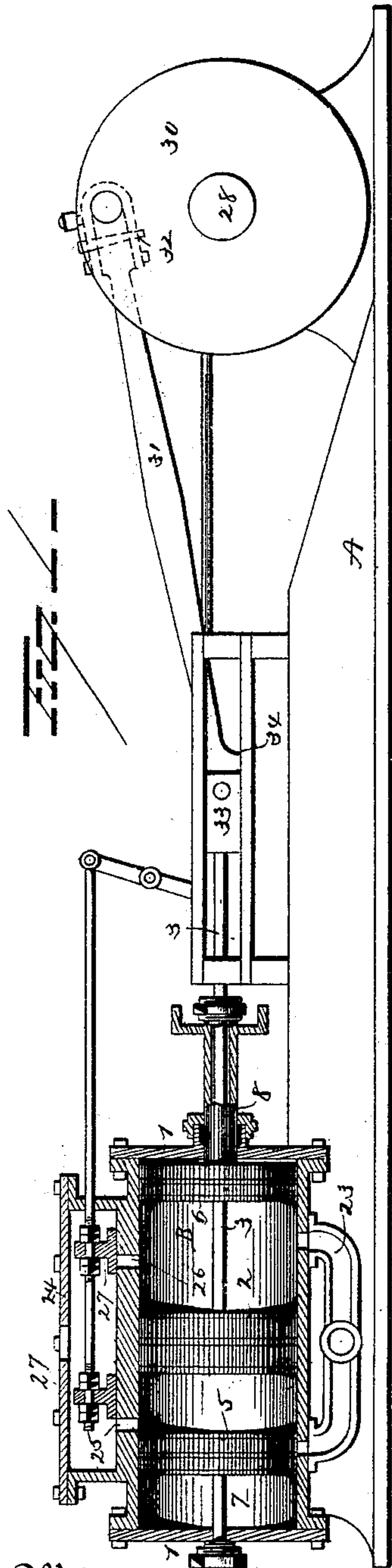


(No Model.)

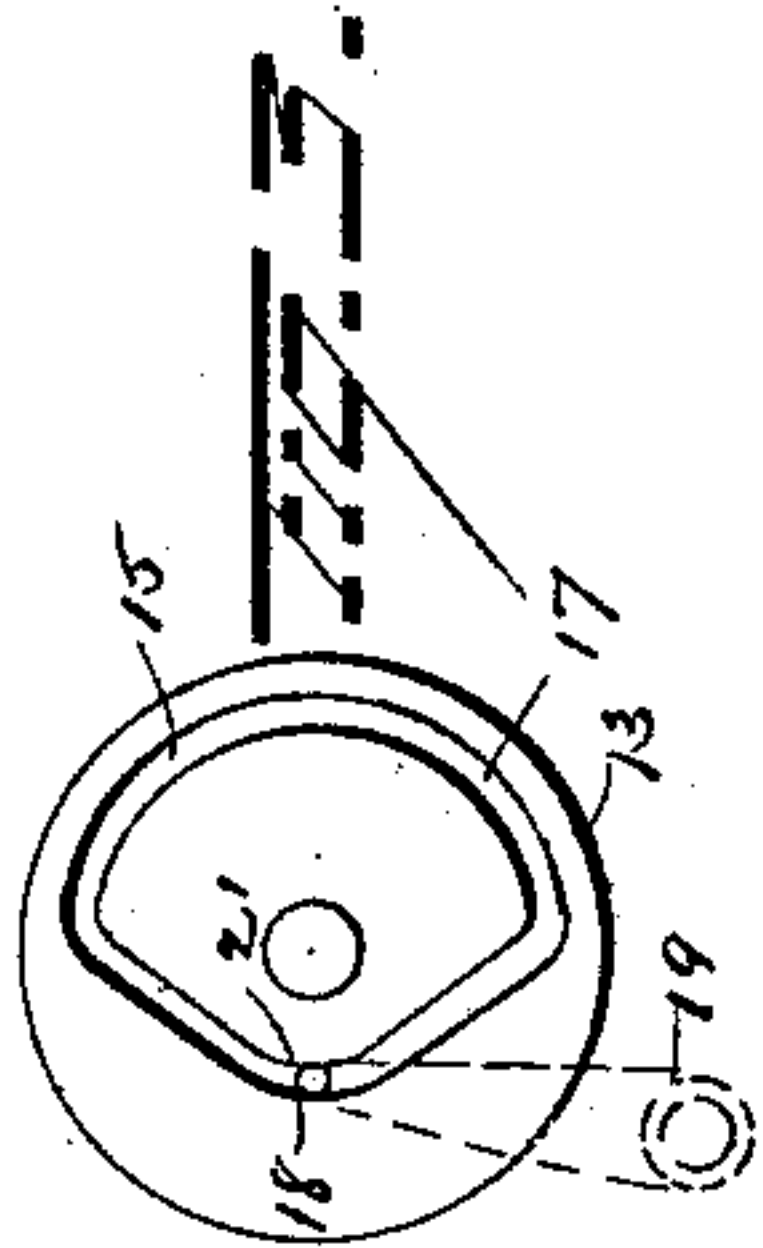
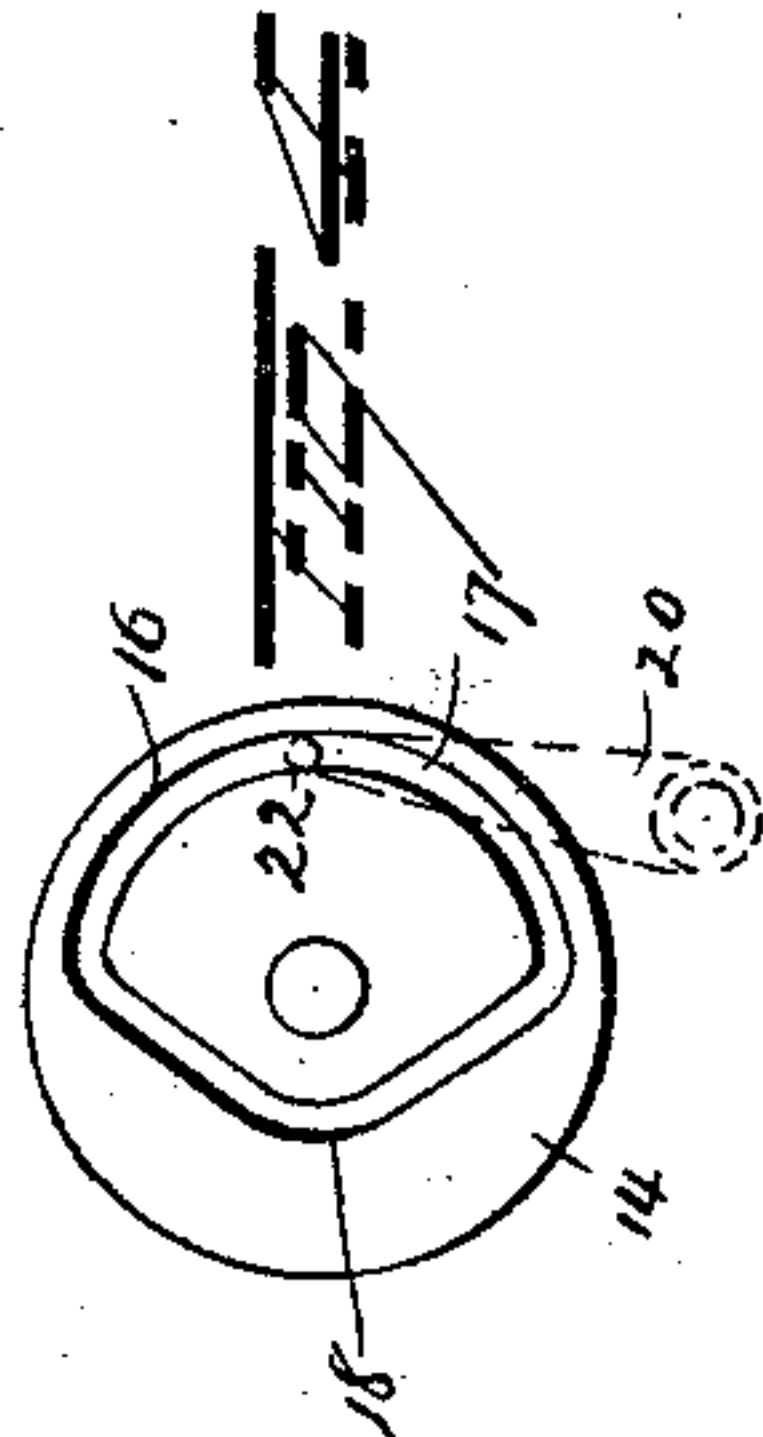
E. HUBER.
STEAM ENGINE.

No. 414,045.

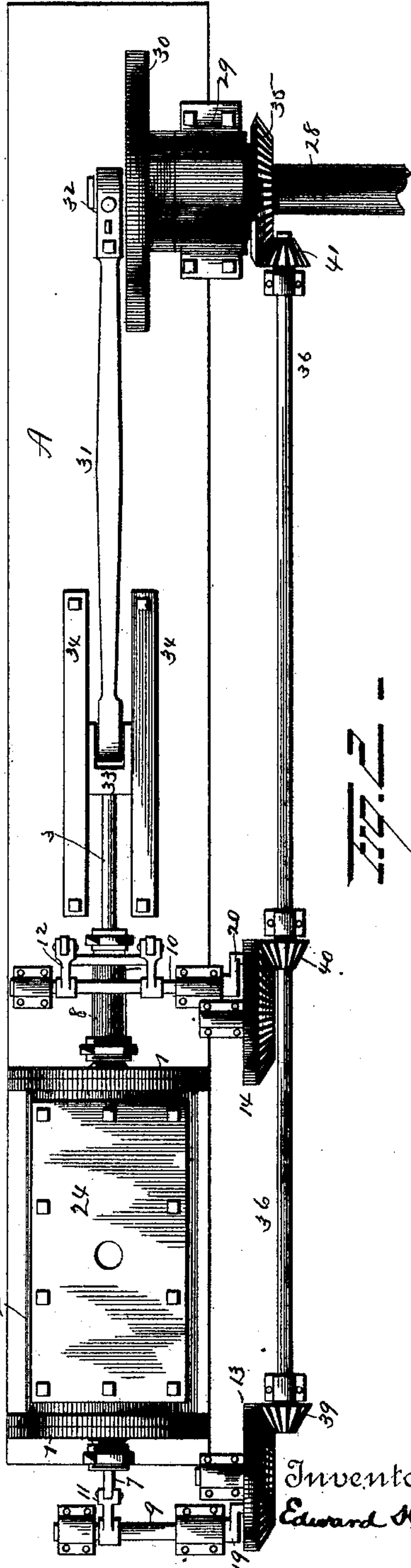
Patented Oct. 29, 1889.



Witnesses
R. W. Mueshaw
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By his



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Inventor
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UNITED STATES PATENT OFFICE.

EDWARD HUBER, OF MARION, OHIO.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 414,045, dated October 29, 1889.

Application filed April 25, 1889. Serial No. 308,543. (No model.)

To all whom it may concern:

Be it known that I, EDWARD HUBER, of Marion, in the county of Marion and State of Ohio, have invented certain new and useful

5 Improvements in Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

10 My invention relates to an improvement in steam-engines, and more particularly to cylinders for such engines.

The object is to economize steam and provide means for utilizing the power of steam

15 the instant it passes into the cylinder.

With these ends in view my invention consists in a steam-cylinder having reciprocating heads therein and gearing for moving these heads at proper intervals to limit the live-

20 steam space and close the exhaust-steam port back of the piston and to simultaneously increase the exhaust-steam space and open the exhaust-port in front of the piston.

My invention further consists in certain

25 novel features of construction and combinations of parts, as will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of an engine. Fig. 2 is a plan

30 view, and Figs. 3 and 4 are detached views of cam gear-wheels.

A represents the bed of the engine, and at one end of this bed the steam-cylinder B is located. The cylinder is of the usual construction, having the heads 1 1 secured to its

35 ends. With the cylinder the piston 2 is fitted, and from it piston-rod 3 extends outward through one of the cylinder-heads in the usual manner. A pair of movable heads 5 6 are

40 fitted in the cylinder—one at each end—and these heads not only follow the piston-head for a short distance, but also control the exhaust-ports, acting as valves for the latter. Stems 7 and 8 extend from the movable heads

45 5 and 6, respectively, out through the ends of the cylinder, and by means of these the heads are reciprocated at proper intervals. Rocking shafts 9 and 10 are located transversely of the cylinder at either end of the latter, and

50 they are connected with the stems 7 and 8 by means of cranks 11 and 12. It is essential that these shafts should be rocked a certain

distance and at certain predetermined intervals. To this end various systems of gearing may be resorted to, and I do not wish to be

55 limited to any particular system; but the following has been adopted as being practical. Bevel gear-wheels 13 and 14 are revolubly mounted with their backs toward the rocking shafts, and the backs of these wheels are fur-

60 nished with cams 15 and 16, respectively. These cams are somewhat peculiar in shape to suit the requirements. As constructed the greater portions 17 of these cams extend half around the wheels near and parallel

65 with their peripheries, and then bend inward to points 18, about midway between the hub and periphery on the opposite side of the hub from the portions just described and concentric with the hub at the point where it comes

70 nearest the latter. These wheels are placed on their shafts so that the cams extend in the same direction, for when one of the movable heads is nearest the end of the cylinder the other moves away from it, and vice versa.

75 Arms 19 and 20 project from the ends of the shafts 9 and 10 adjacent to the gear-wheel, and anti-friction rollers 21 and 22 on the ends of these arms engage the cams whereby the shafts are rocked. The usual exhaust-ports

80 23 extend from the ends of the cylinder, and these are controlled by the movable heads. A valve-chest 24 is located on the cylinder and furnished with ports 25 and 26, which

85 lead into the cylinder. The slide-valves 27 control the passage of steam to the cylinder, and these valves are reciprocated at suitable intervals by a connection with the piston-rod. (Not shown.)

The main shaft 28 is revolubly supported

90 in pillow-block 29, and on one end of this shaft a fly-wheel 30 is secured. A pitman 31 is connected at one end of this fly-wheel by strap-head 32 and at its opposite end to the cross-head 33, which slides in frame 34 and is

95 secured to the piston-rod 3.

A bevel gear-wheel 35 is mounted on shaft 28 on the opposite side of the pillow-block from the fly-wheel, and a shaft 36, extending in proximity to the three gear-wheels 13, 14,

100 and 35, is provided with bevel gear-wheels 39, 40, and 41, which mesh with said wheels.

It will be observed that as soon as the piston has made part of its stroke the mov-

able head back of it follows it a certain distance, filling part of the steam-space. In this movement the head following the piston closes the exhaust-port and stops just before it passes the live-steam port. The head following the piston forms practically the head of the cylinder, thus economizing space, as steam is never beyond the movable heads, and hence the rigid heads need not be air or steam tight. Before or simultaneously with the return movement of the piston the head which was behind the piston now begins to move toward its rigid head, while the other head advances and closes the exhaust. The parts are so arranged that when the piston is at its extreme throw the strap-head has always passed its dead-center, so that the full leverage of the fly-wheel is utilized. Thus the advantages are that the space for live steam is kept approximately the same by the movable head keeping a certain distance from the piston; that the greatest leverage is taken advantage of, inasmuch as the strap-head has passed the dead-center when the steam first enters from the steam-chest, and that the exhaust-steam is given increased space by the withdrawal of the head, thus reducing the pressure on that end of the piston.

It is evident that slight changes might be resorted to in the form and arrangement of the several parts described without departing from the spirit and scope of my invention, and hence I do not wish to limit myself to the particular construction herein set forth; but, Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a cylinder having

inlet and exhaust ports, of a piston, movable heads located within the cylinder for closing the exhaust-ports, a main shaft actuated by the piston, a rotary shaft located alongside of the cylinder and extending in the direction of the length thereof, gearing connecting the rotary shaft and main shaft, and gearing on the rotary shaft for actuating the movable head, substantially as set forth.

2. The combination, with a steam-cylinder and movable heads therein, of rocking shafts, bevel gear-wheels having cams for rocking the shafts, and gearing for operating the cams, substantially as set forth.

3. The combination, with a steam-cylinder and movable heads therein, of rocking shafts connected with the heads, said shafts having arms with anti-friction rollers thereon, bevel gear-wheels with cams on their backs in which said rollers travel, and means for turning said gear-wheels, substantially as set forth.

4. The combination, with a cylinder and movable heads, of stems connected with the heads, rocking shafts for driving the stems, arms on the shafts with rollers thereon, bevel gear-wheels having cams, substantially as described, on their backs, with which the rollers engage, a main shaft having a bevel gear-wheel, and a shaft having bevel gear-wheels meshed with the other gear-wheels for communicating motion, substantially as set forth.

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

EDWARD HUBER.

Witnesses:

JOHN A. WOLFORD,
JOHN F. MCNEAL.