

No. 794,248.

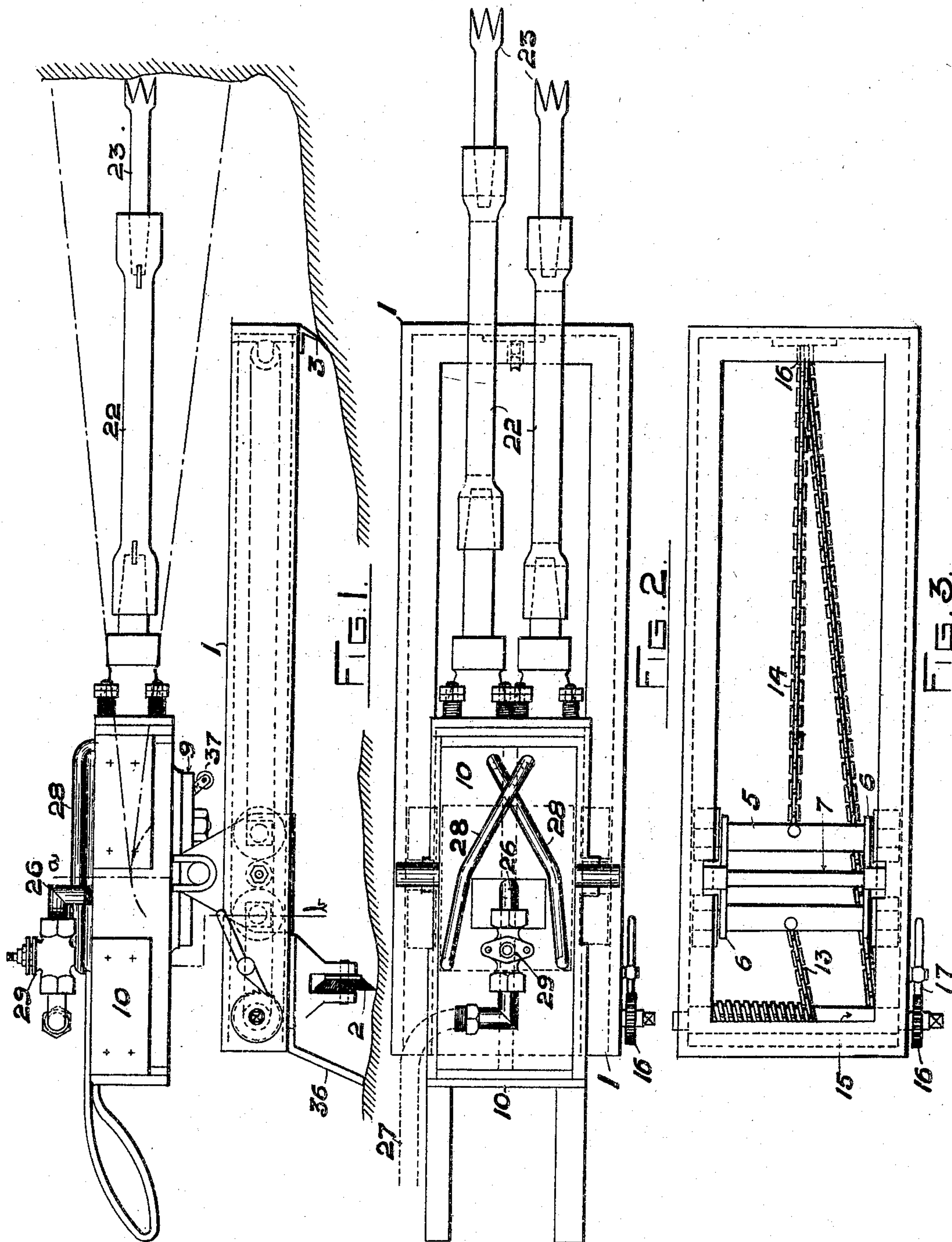
PATENTED JULY 11, 1905.

J. G. PATTERSON.

ENGINE FOR COAL CUTTING MACHINES.

APPLICATION FILED APR. 14, 1903.

2 SHEETS—SHEET 1.



WITNESSES:

William Eastwood.

John Camp.

Ιπνεπζοτ:

John George Patterson

By his Attorney:

Walter Gurne.

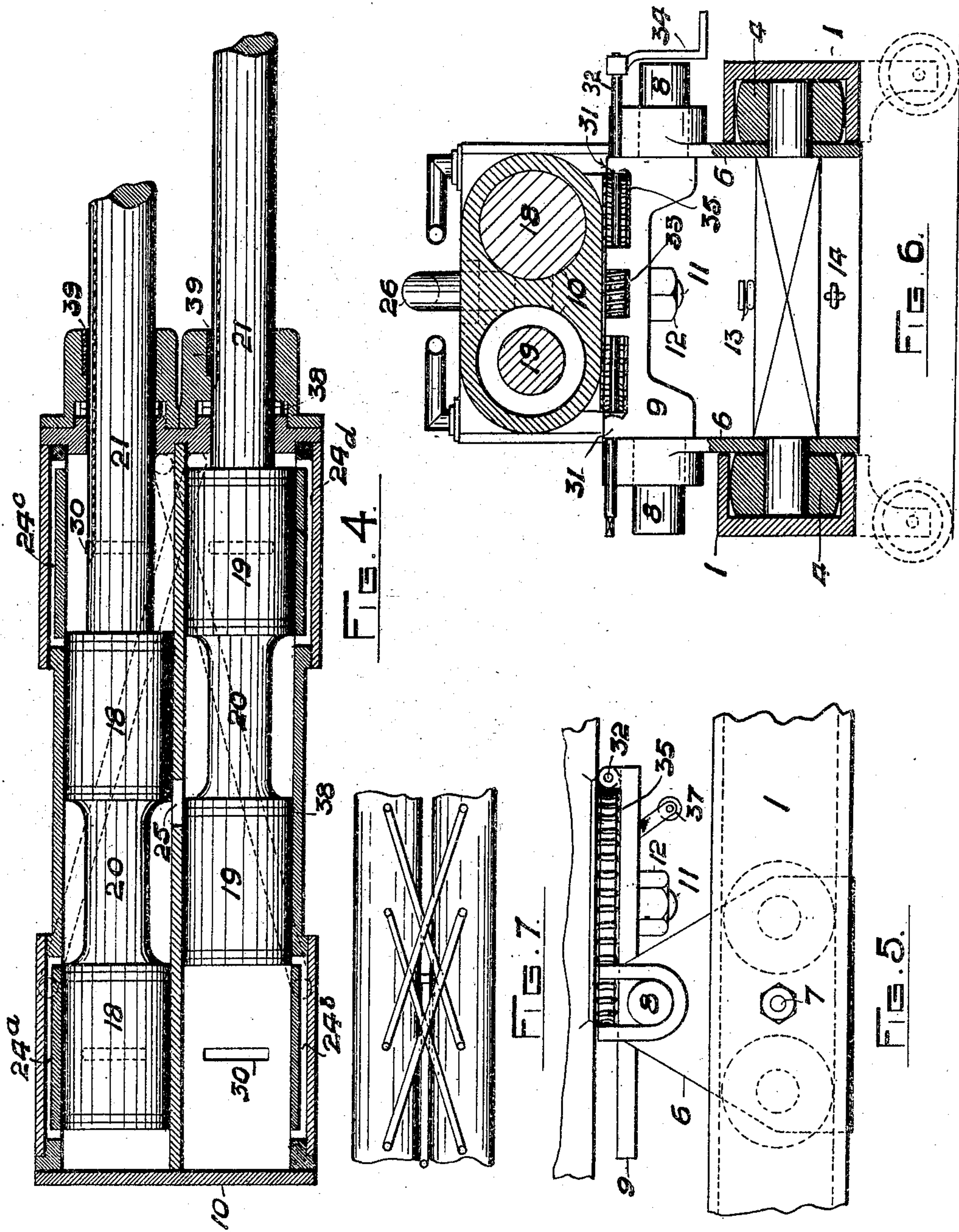
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Witnesses:

William Eastwood
John Camp.

Inventor:

John George Patterson
Walter Gunn.

By his Attorney:

UNITED STATES PATENT OFFICE.

JOHN GEORGE PATTERSON, OF MANCHESTER, ENGLAND.

ENGINE FOR COAL-CUTTING MACHINES.

SPECIFICATION forming part of Letters Patent No. 794,248, dated July 11, 1905.

Application filed April 14, 1903. Serial No. 152,504.

To all whom it may concern:

Be it known that I, JOHN GEORGE PATTERSON, a subject of the King of Great Britain and Ireland, and a resident of Manchester, England, have invented certain new and useful Improvements in Engines for Coal-Cutting Machines, of which the following is a specification.

This invention relates to and consists of a new or improved construction of percussive coal-cutting machine; and it consists of the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claim.

To permit of my invention being readily understood, I will now describe the same with reference to the appended drawings, wherein—

Figure 1 is a side elevation, and Fig. 2 a plan, of a coal-cutting machine embodying my invention. Fig. 3 is a plan of the underframe and carriage alone. Fig. 4 is a sectional plan; Fig. 5, a part side elevation, and Fig. 6 a transverse vertical section, on line *a b* to a larger scale. Fig. 7 is a plan of a modification.

The numeral 1 designates the underframe of the machine, composed of iron or steel of channel-section (see Fig. 6) and of a length suited to the average length or depth of cut. Each frame at one end is mounted upon wheels 2, (see dotted lines, Fig. 6,) having beveled peripheries, and such wheels while serving to support the frame and allow it to travel laterally serve chiefly to resist the recoil of the machine, their sharp edges digging into the ground and preventing the frame running backward. For further helping to steady the machine when at work the front end of the frame may have spikes 3, only one of these spikes being shown. Within such frame and its longitudinal channels are mounted the rollers or wheels 4 of a carriage 5, comprising the axles of the said rollers, two end plates 6, and a cross-stay or connecting-rod 7. In the said plates are formed the bearings for the trunnions 8 of a plate 9, upon which rest the cylinders 10. These latter are by preference in one casting, and centrally beneath them is the stud or pivot 11, which passes loosely through the plate 9, and below

such plate is provided with a nut 12. Due to the stud 11 the cylinders may be rotated in a horizontal plane, while due to the trunnions 8 the cylinders may rotate in a vertical plane, and thus enable the machine to work over a wide range. Due also to the rollers 4 of the carriage being free to roll along the channels of the frame the cylinders are also adapted to be traversed to and fro along the frame, and thus approach or recede from the face of the coal for the depth of cut required.

To readily move the cylinders to any point along the frame and cause them to be held stationary after being so moved at any point, two chains 13 14 are employed, each having one end connected to the carriage 5 and the other end connected to a barrel or axle 15, but so arranged that when one chain is wrapped around the axle 15 the other chain is unwrapped, according as the carriage is at one end of the underframe or the other, the chain 14 also passing around a pulley 16, as shown, to insure of the carriage being traversed to each end. The end of the axle 15 outside the frame is squared to receive a handle, so that on rotating the axle the chains are wrapped and unwrapped and the carriage and cylinders readily traversed along the frame and when at rest prevented, to a large extent, accidentally moving. To guard against accidental moving, the axle 15 may have a ratchet-wheel 16 and pawl 17, or the axle may be rotated by a worm and worm-wheel.

Each cylinder is fitted with a double piston or ram 18 19, joined by a narrow neck part 20, as shown in Fig. 4, and each ram is connected to or formed in one with a piston-rod 21. To each rod is fitted a tool-holder 22, and to each holder a cutting-tool 23.

In the sides of the cylinders are the ports or passages 24^a, 24^b, 24^c, and 24^d, and in the central wall is an inlet-port 25 common to the two cylinders, into which opens the pipe 26, by which and a flexible hose-pipe 27 air under pressure from an air-compressor is conveyed into the cylinders.

The length of each ram or piston and that of the reduced part 20 is such that the central port 25 is never covered, and the op-

posite ends of any one of the other ports are never simultaneously covered. Leading from the port at the forward end of each cylinder to the opposite or rear end of the other cylinder are pipes 28, one passing over the

5 cylinder are pipes 28, one passing over the other, as shown in Fig. 2, or otherwise.
In the length of the pipe 26 is a controlling-valve 29, upon the opening and shutting of which the machine is started and stopped.
10 Air being admitted to the cylinders and with the rams in the position shown in Fig. 4, the action is as follows: First, the air passes into both cylinders through the port 25. It then finds its way through the ports 24^a and
15 24^d and behind the ends of the two rams 18 19, where, acting upon such rams, it moves them to the opposite ends of the cylinders and causes them to cover the ports 24^a 24^d and uncover the ports 24^b 24^c. The air then
20 finds its way through the ports 24^b 24^c and drives the rams back again, and so on continuously, one ram moving in one direction and the other ram moving in the opposite direction, and thus causing the cutters to act
25 alternately upon the face of the coal. The air admitted behind the ram of one cylinder also finds its way in front of the ram of the other cylinder, and vice versa, through the cross-pipes 28, thus insuring that the rams
30 shall always act alternately, as well as insuring that in the event of either ram failing to uncover the ports it shall be returned by reason of the air conveyed through the cross-pipe. The air is exhausted through exhaust-ports 30,
35 which are so placed relatively to the ends of the cylinders and the working strokes of the pistons that a small amount of air at atmospheric pressure is always left in the cylinders and behind the pistons, which acts as a buffer
40 or cushion for the pistons, and thus prevents undue noise and excessive vibration of the machine. Under the alternating action of the cutters the return stroke of one ram is to a large extent balanced by the forward stroke
45 of the other. Hence the strain of holding the machine to its work is less than with an ordinary machine.

To facilitate the rotation of the cylinders

on the stud 11, the plate 9 may have ears 31, forming the bearings of a shaft 32, carrying a 50 worm 33 and handle 34, and the base part of the cylinders may have a worm-wheel or ring of worm-wheel teeth 35; but in practice I prefer to move the cylinders by hand and to leave them free to oscillate on the stud 11 in 55 order that the cutters may free themselves of the coal after each impact.

In lieu of or in addition to the wheels 2 for staying the underframe a plate 36, with spiked edge, may be used; but I prefer the 60 wheels only.

To give a longer or deeper cut than the traverse of the carriage allows, longer cutters are used.

To prevent the front ends of the cylinders 65 falling too low, the plate 9 is provided with a strut and roller 37, which bears upon the frame when the cylinders are unduly depressed.

In lieu of the ports being in the substance 70 of the cylinders they may be in the form of pipes, (see Fig. 7;) but I prefer the arrangement shown in Fig. 4, in that the ports are readily accessible, being only covered by a removable cover-plate. 75

To maintain a tight fit, the pistons and piston-rods are packed with metallic packing 38, and to prevent the pistons and cutters rotating the piston-rods have a groove, and the cylinder ends or covers a key 39. 80

What I claim is—

In combination, a pair of cylinders, a double piston in each cylinder, a piston-rod for each piston, and a cutting-tool for each piston-rod, the said cylinders having an inlet- 85 port common to both and ports which convey air under pressure alternately behind the opposite ends of the piston, and ports which convey the air in one cylinder to the opposite end of the other cylinder. 90

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

JOHN GEORGE PATTERSON.

Witnesses:

WALTER GUNN,
WILLIAM EASTWOOD