(No Model.) 2 Sheets—Sheet 1.

S. STUTZ.

COAL AND ORE MINING MACHINE.

No. 302,959. Patented Aug. 5, 1884.

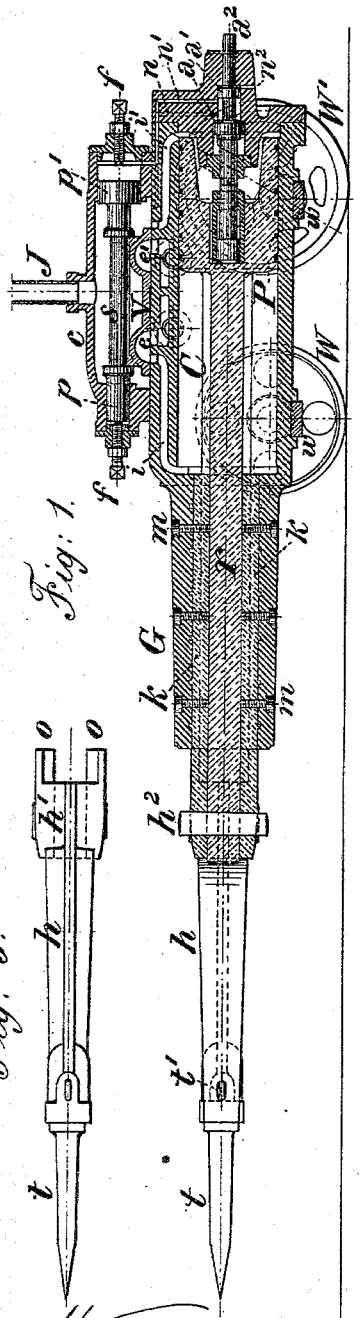

Fig. 1.

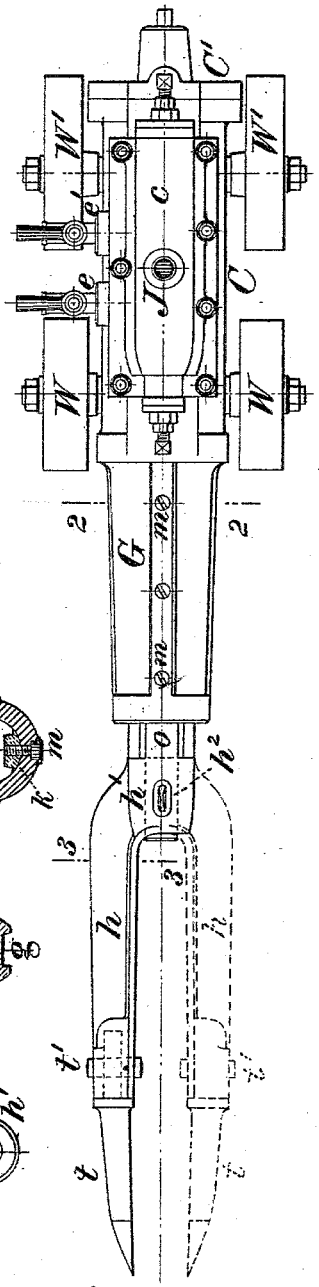

Fig. 2.

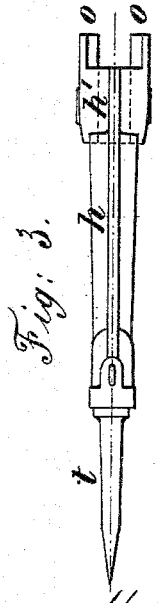

Fig. 3.

Fig. 6.

Fig. 5.

Fig. 4.

Witnesses:
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(No Model.) 2 Sheets—Sheet 2.

S. STUTZ.

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Fig: 7.

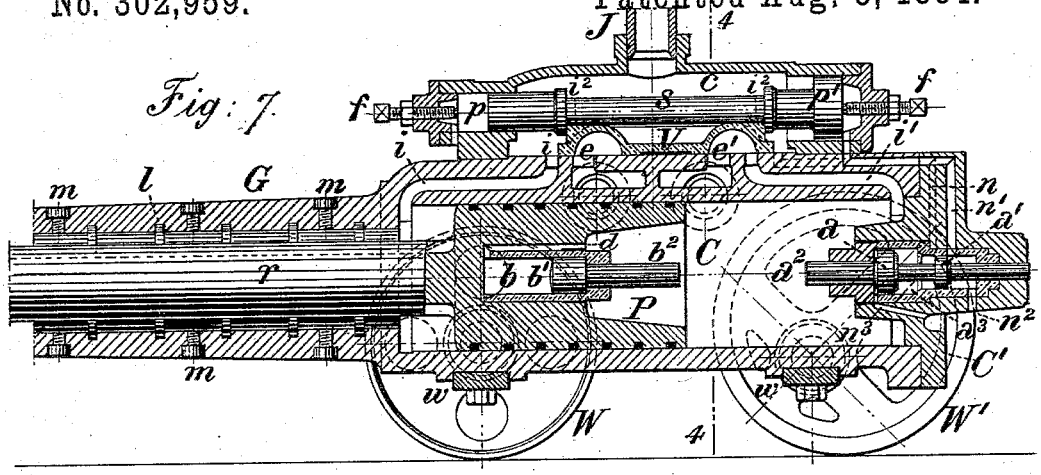


Fig: 8.

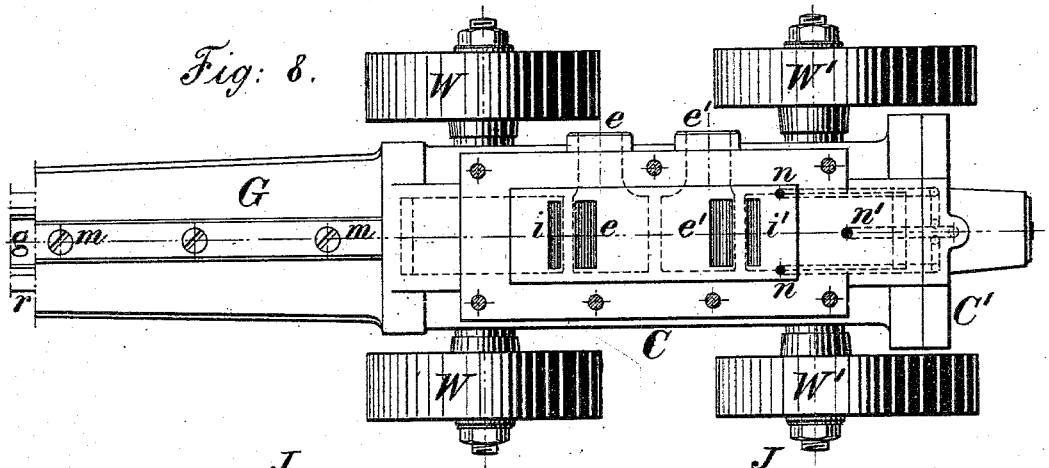


Fig: 9.

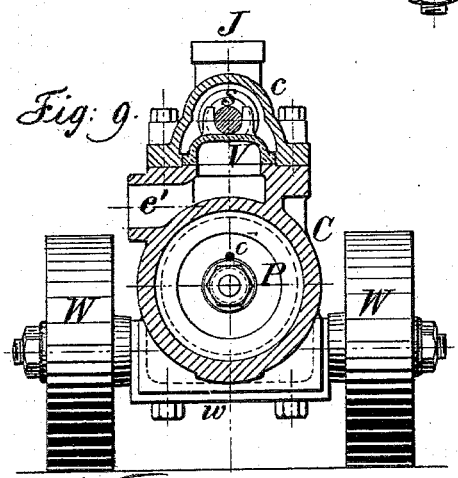
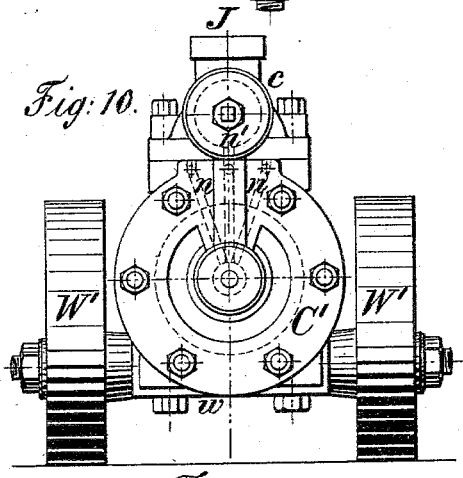


Fig: 10.



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R. H. Whittlesey

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his Atty

UNITED STATES PATENT OFFICE.

SEBASTIAN STUTZ, OF PITTSBURG, PENNSYLVANIA.

COAL AND ORE MINING MACHINE.

SPECIFICATION forming part of Letters Patent No. 302,959, dated August 5, 1884.

Application filed September 10, 1883. Renewed June 25, 1884. (No model.)

To all whom it may concern:

Be it known that I, SEBASTIAN STUTZ, a citizen of the United States, residing at Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Coal and Ore Mining Machines; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a vertical longitudinal central section through a mining-machine embodying my invention; Fig. 2, a plan or top view of the same; Fig. 3, a side view, in elevation, of the pick and holder; Fig. 4, a transverse section through the pick-holder at the line 3 3 of Fig. 2; Fig. 5, a similar section through the piston-rod; Fig. 6, a similar section through the guide at the line 2 2 of Fig. 2; Fig. 7, a vertical longitudinal central section, on an enlarged scale, through the cylinder, valve-chest, and portion of the guide; Fig. 8, a plan or top view of the same, with the valve-chest removed; Fig. 9, a transverse section at the line 4 4 of Fig. 7, and Fig. 10 an end view as seen from the rear.

My invention relates to a machine for undercutting or undermining, slotting, and excavating as required in mining coal, ore, &c., preparatory to wedging or blasting out and displacing the mass of material; and it consists in certain novel devices and combinations, hereinafter set forth, for operating the valve, locating, securing, and guiding the pick, pick-holder, and piston-rod, and adjusting and directing the position and movements of the apparatus.

To carry out my invention I provide a cylinder, C, which is mounted and supported upon two pairs of wheels, W W and W′ W′, each fitted to rotate upon journals formed on the ends of bars *w w*, which are bolted to the under side of the cylinder, the front pair of wheels, W W, being made concentric with, and the rear pair, W′ W′, eccentric to, their journals, for a purpose presently to be described. A valve-chest, *c*, is secured upon the upper side of the cylinder, and a slide distribution-valve, V, governing ports *i i′ e e′* in the cylinder, is adapted to be reciprocated upon a valve-face thereon within the chest *c*. A piston, P, formed with or secured to a piston-rod, *r*, is fitted to the bore of the cylinder C, and is reciprocated therein by steam or compressed air, which is supplied to the valve-chest by a flexible pipe provided with a valve and connected to the pipe J, and is alternately admitted to and exhausted from opposite sides of the piston by the movements of the valve V. Two longitudinal grooves or channels, *g*, are formed in the piston-rod and extend throughout its length, said grooves fitting accurately a series of bushings, *k k*, which are secured by means of set-screws *m* and ribs or collars *l* within a long guide, G, projecting centrally from the front end of the cylinder C, the guide being, by preference, cast with the cylinder to afford an accurate bearing. The rod is thus properly guided and supported, prevented from turning, and packed against the escape of steam or air. The cutting-tool or pick *t*, which is of rectangular transverse section, and substantially similar to one-half of an ordinary miner's pick, is secured by a key, *t′*, or otherwise, so as to be readily removed and replaced, as required, to the front end of a pick-holder, *h*, which projects longitudinally from one side of a socket, *h′*. The connection of the pick-holder and the piston-rod is effected by means of ribs *o o* on the rear end of the socket, which fit into the grooves *g g* of the piston-rod, and by a key, h^2, passing through the rod and socket. The pick-holder may be made either single or double, and may carry either one or two picks, as indicated in Fig. 2; and by the location of the picks, as described, outside of the center line of the machine the operator is enabled to better observe and direct the movements of the tool. As before stated, the front bearing-wheels, W W, are mounted concentrically, and the rear wheels, W′ W′, eccentrically, upon their journals, in order to enable the operator, when sitting behind the apparatus, to readily direct the point of the pick either upward or downward, or to one side or the other, as may be required, by applying his hands to the rear wheels and turning them either backward or forward, or swinging the machine upon them. The rear wheels thus serve as the handles of the machine, and the same, being light and compact, can be operated by one man with

great ease. Undercutting or "bearing in" is quickly performed by bringing the tool close to the face of the material and directing its blows at the proper place. The length of the pick which is to be secured to the holder will vary correspondingly with the depth of the undercutting or slotting to be done.

The required reciprocating movement is imparted to the piston P and the pick connected thereto in the following manner: Two pistons, p and p', of unequal areas, the latter being about twice that of the former, are formed upon or secured to a common stem, s, and are fitted to reciprocate in chambers or sockets in the valve-chest c. Collars i^2 i^2 on the stem s engage shoulders on the back of the valve V, which will consequently be caused to move coincidently with the pistons p p', the traverse of which may be regulated, as required, by set-screws f f. In the position of the parts shown in Fig. 7 the main piston P is on and near the commencement of its backward stroke. The preponderance of pressure upon the inside of the larger valve-operating piston p' has moved the pistons p p' and the connected valve V to the right, and operating-fluid is being supplied to the left side of the main piston through the port i, and exhausted from the right side through the ports i' and e'. The piston P will consequently continue to move backward until it reaches the extremity of its stroke, being the position shown in Fig. 1. The valve V is moved to the left, to effect the forward stroke of the piston, by means of two auxiliary valve-operating pistons, a and a', of unequal areas, and fixed upon a common stem, a^2. The pistons a a' work in communicating chambers or sockets a^3, formed in the front head, C', of the cylinder C, and their stem a^2 projects through said head into the cylinder. Ports n n lead from the chambers a^3 to the valve-chest, into which they open on the left side of the larger valve-operating piston p', and a port, n', extends from the valve-chest on the right-hand side of the piston p' to the chambers a^3, in which its opening is so located that the smaller auxiliary piston a', when at the left-hand end of its stroke, will be interposed between it and the openings of the ports n. An exhaust-port, n^2, leads outwardly from the chamber of the piston a' at or near the right-hand thereof, and a port, n^3, which is designed to prevent back-pressure, leads outwardly from the left-hand end of the chamber of the piston a. A cushion-chamber, b, is formed in the interior of the main piston P, and is constantly in communication with the interior of the cylinder C through a port, d. A piston, b', is fitted to the cushion-chamber, its stem b^2 projecting through the same toward and in line with the stem a^2 of the pistons a a'. During the forward or left-hand traverse of the main piston P the stem b^2 of the cushion-chamber is driven outward, by the pressure acting through the port d, into the position shown in Fig. 7, and is there maintained until, by striking the stem a^2, which it does before the termination of the right-hand stroke of the main piston P, it moves the stem a, and is itself moved into the positions shown in Fig. 1, and the parts are then in readiness for the commencement of the forward stroke. The operating-fluid (steam or compressed air) will then pass from the valve-chest c, through the ports n n', to the right-hand side of the larger valve-operating piston p', and move the latter, with the valve V, to the left and into the positions shown in Fig. 1. The main piston P will then receive pressure from the right over its full area, and will effect a powerful stroke of the pick against the material to be acted on. During this stroke the auxiliary pistons a a' are returned to the position shown in Fig. 7 by the excess of pressure upon the larger piston a, the operating-fluid is exhausted from behind the larger valve-operating piston p' through the ports n' n^2, and the valve V is thrown to the right to effect the next backward stroke of the main piston.

It will be observed that the exhaust-cavity is divided by a central partition into two compartments, each provided with a separate discharge, and governed by a cock or valve by which the outlet-opening may be regulated to control the operation of the apparatus at pleasure.

I claim herein as my invention—

1. In a mining-machine, the combination, substantially as set forth, of a steam or air cylinder, a piston and rod working therein, and adapted to reciprocate a pick or cutting-tool, a pair of supporting-wheels mounted concentrically on the cylinder near its forward end, and a pair of supporting-wheels mounted eccentrically on said cylinder near its rear end.

2. In a mining-machine, the combination, substantially as set forth, of a steam or air cylinder, a piston and rod working therein, a pick-holder having a lateral socket secured upon the outer end of the piston-rod, and a pick or cutting-tool secured to the outer end of the pick-holder, substantially in line with the body thereof.

3. In a mining-machine, the combination, substantially as set forth, of a steam or air cylinder, a piston fitting therein, a longitudinally-grooved piston-rod fixed to said piston, a guide projecting from one end of and inclosing the piston-rod, and a series of bushings secured within said guide and fitting a groove or grooves in the piston-rod.

4. In a mining-machine, the combination, substantially as set forth, of a longitudinally-grooved piston-rod and a pick or tool holder, the body of which projects longitudinally from one side of a socket which surrounds the piston-rod, and is provided with ribs or projections fitting into a groove or grooves therein.

5. The combination, substantially as set forth, of a steam or air cylinder, a piston and rod working therein, a main slide distribution-valve governing the supply and exhaust of the main piston, a pair of differential valve-oper-

ating pistons connected to said main valve, and auxiliary valves or pistons operated by the movement of the main piston and governing supply and exhaust openings leading to and from the valve-operating pistons.

6. The combination, substantially as set forth, of a steam or air cylinder, a piston and rod working therein, a main slide distribution-valve governing the supply and exhaust of the main piston, a pair of differential valve-operating pistons connected to said main valve, a pair of auxiliary differential pistons working in a chamber in the rear head of the cylinder, a cushion-chamber in the main piston, a piston and rod working in said cushion-chamber and imparting movement in one direction to the auxiliary pistons, ports connecting the chamber of the valve-operating pistons with the chambers of the auxiliary pistons, and an exhaust-port leading from the chamber of the auxiliary pistons to the atmosphere.

In testimony whereof I have hereunto set my hand.

SEBASTIAN STUTZ.

Witnesses:
R. H. WHITTLESEY,
J. SNOWDEN BELL.