P. H. SHARP.

Coal and Ore Breaker.

No. 223,299. Patented Jan. 6, 1880.

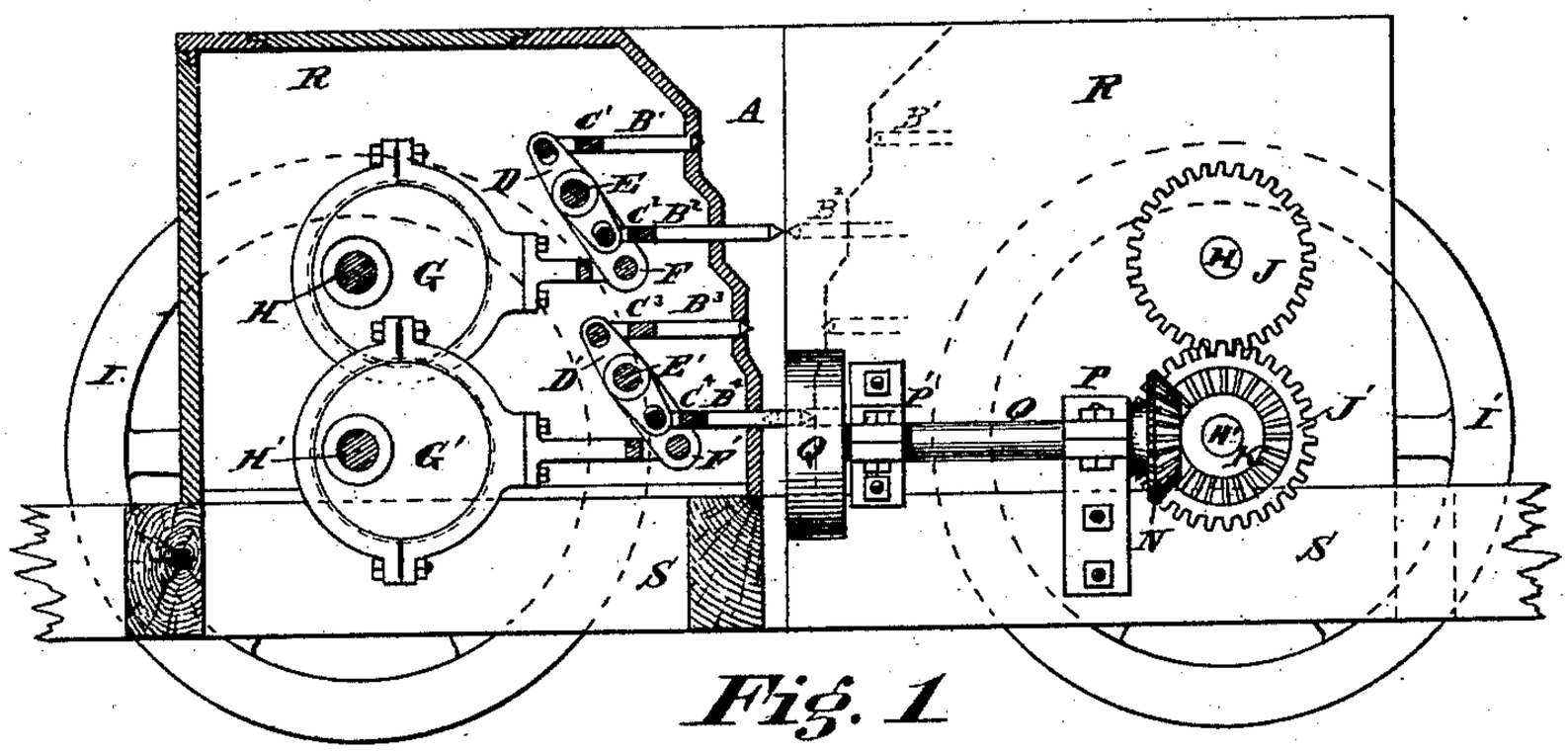

Fig. 1

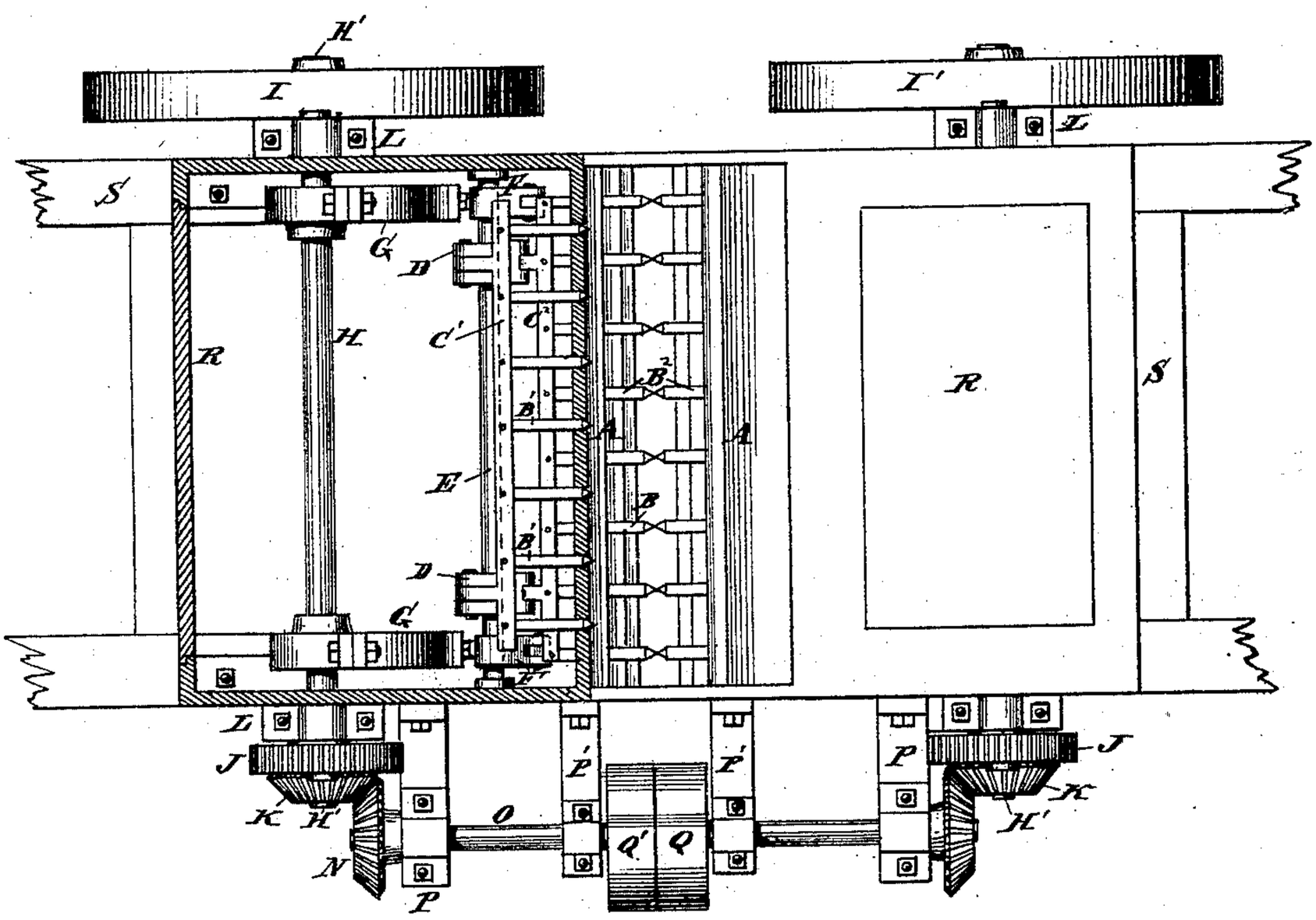

Fig. 2

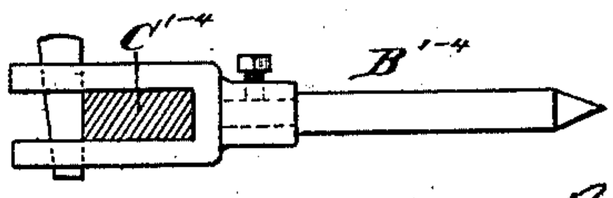

Fig. 3

Attests

Gordon Tackel

Jos Zane Jr.

Inventor

Philip H. Sharp.

By his attorney

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

PHILIP H. SHARP, OF HARRISBURG, PENNSYLVANIA.

COAL AND ORE BREAKER.

SPECIFICATION forming part of Letters Patent No. 223,299, dated January 6, 1880.

Application filed October 9, 1879.

To all whom it may concern:

Be it known that I, PHILIP H. SHARP, of Harrisburg, in the county of Dauphin and State of Pennsylvania, have invented an Improvement in Coal and Ore Breakers, of which the following is a specification.

My invention relates to that class of coal and ore breakers in which the mineral to be broken is placed in a stationary hopper and is broken into various sizes by picks; and it consists, first, in constructing a stationary hopper of metal and in the form of steps, each step being furnished with a series of picks or breakers; second, in constructing the faces of the hopper opposite the respective series of picks perpendicular to the line of movement of such picks, so that the mineral does not slide away from the picks when the same are projected forward; third, in picks arranged in series, one above the other, in combination with suitable mechanism for operating them in such a manner that they have a reciprocating motion across the hopper, and that any two adjacent series of picks on one side move in opposite directions at the same instant; fourth, in mechanism for imparting the necessary motion to the picks, which consists of a combination of levers, cranks, and eccentrics, as hereinafter set forth.

The object of my invention is to design a coal and ore breaker which may be especially adapted for the rebreaking of coal to produce the smaller sizes, known as "egg," "stove," "chestnut," and "pea," which are usually made by "monkey" or "pony" rollers at a loss of twenty to twenty-five per cent. It may likewise be used to make larger sizes direct from the pit-chute.

My object is further to construct a breaker so that the following advantages may be obtained: First, the coal or ore operated on is split and not pulverized, thus accomplishing by machinery the old hand process of breaking; second, the waste will not exceed from five to ten per cent.; third, less power is required to drive it than to drive the rolls; fourth, broken or dulled teeth can be more easily removed for the purpose of renewal or repair than in any other toothed breaker now on the market; fifth, the action of the machine will produce a brighter coal than is now produced, which will consequently command a better market; sixth, the waste being small, the expense of hauling such waste will be greatly reduced.

In the accompanying drawings, Figure 1 is an elevation of my improved breaker, showing one-half in section. Fig. 2 is a plan of same, showing the top cut from off one-half to show mechanism below. Fig. 3 is an enlarged view of one of the picks.

A is a fixed graduated hopper, which is built of metal and shaped in the form of steps with inclined tops or treads. Through each of the vertical parts of the hopper are a series of holes, through which the picks B′ B^2 B^3 B^4 move. The picks B′ B^2 B^3 B^4 are secured to bars C′ C^2 C^3 C^4, as shown in Fig. 3, or by set-screws alone. Picks B′ and B^2 are fast, respectively, to bars C′ and C^2, which bars are hinged to the oscillating levers D D, whose fulcrum is the shaft E, and to which they are secured. Picks B^3 and B^4 are secured, respectively, to bars C^3 and C^4, which are hinged to oscillating levers D′ D′, whose fulcrum is the shaft E′, and to which they are firmly fastened. Secured to the shafts E and E′ are cranks F F′. These cranks are connected at their extremities, through the agency of small rods, to the eccentric straps of the eccentrics G G′, which are fast upon and rotate with the shafts H and H′, respectively. Secured to the shaft H′ at one end is a fly-wheel, I, and at the other a pinion, J′, and bevel-wheel K. These shafts H and H′ have bearings L L. The pinion J′ meshes with a pinion, J, upon the shaft H. Meshing with the bevel-wheel K is another bevel-gear, N, which is secured upon the shaft O, which rotates in bearings P P P′ P′. Upon the shaft O, and between the bearings P′ P′, are pulleys Q Q′. The pulley Q is fast upon the shaft O, while the pulley Q′ is an idler.

Having now described the mechanism lying on one side of the hopper, that upon the other side being similar to it, the description would be precisely the same; hence like letters of reference correspond to like parts of the machine on either side of the hopper.

The whole machine may be inclosed by a metallic box, R, and the whole supported upon timbers S.

By this construction it is evident that to operate two whole series of picks only one eccentric is necessary; but two are desirable, as shown, on account of rigidity and positive action.

The picks B^4 pass from each side of the hopper between one another, passing entirely across the opening of the hopper A at this point. The picks B^3 pass each other; yet they do not quite reach the faces of the hopper opposite. Picks B^2 almost meet each other in the center, and picks B′ are still farther apart.

Any or all of the teeth or picks may be made to pass each other, meet, or lack meeting merely by lengthening said picks; hence I do not confine myself to the exact movement of picks given above. In addition to this, it is preferable to have more picks to the lower series than the upper. By this means the coal or ore is broken uniformly and to the proper degree of fineness.

By the means as above described a whole series of picks move simultaneously; but this is not absolutely necessary to constitute my invention, for by making the shaft E stationary and the lever D to oscillate upon it, and to have hinged to either end picks B′ and B^2 and the lower end of lever D extended and hinged to the strap of the eccentric G, Fig. 1, and suppose there were a series of eccentrics, levers, and picks, all arranged as the set just described, and shown in Fig. 1, and each eccentric set a little in advance of the preceding one, the effect of this would be that no two picks on one side of the hopper would move together; yet the construction would be substantially the same. These series of eccentrics, set in advance of each other and operating picks, is patented by me, and bears the number 219,773, and date of September 16, 1879; and this invention is an improvement upon that patent.

Operation: The pulley Q, shaft O, and pinions N N being put in motion, the shafts H′ are rotated in company with their pinions J′. The shafts H are also rotated, only in an opposite direction, by the pinions J J meshing with pinions J′ J′. The eccentrics G G′ being fast upon the shafts, they rotate with them and impart an oscillating motion to the cranks F F′, which cranks are secured to the shafts E E′, thereby producing an oscillating motion in the levers D D′ and a horizontal or parallel motion to the picks B′ B^2 B^3 B^4. By the construction the picks on either side of the hopper at the same level may move in contrary or the same direction at the same instant, whereby the mineral is allowed a chance to fall, and when fallen to the step below it is acted on by the picks belonging to this step, which split it sufficiently to allow its descent to the next step below, and so on until it passes out at the bottom of the hopper.

The fly-wheels I I insure a steady motion to the machine.

I claim—

1. In a coal and ore breaker, a hopper shaped in the form of steps, with holes in the vertical parts of such hopper, through which picks move, whereby the mineral is prevented from slipping away from said picks, constructed substantially as shown and described.

2. In a coal and ore breaker, the picks B′ B^2 B^3 B^4, arranged in series, having a reciprocating motion across the hopper, and operated by means of eccentrics G G′, so that any two adjacent series of picks on the same side move in opposite directions at the same instant, substantially as and for the purpose specified.

3. In a coal and ore breaker, the combination of hopper A, picks B′ B^2 B^3 B^4, bars C′ C^2 C^3 C^4, levers D D′, shafts E E′, cranks F F′, eccentrics G G′, and shafts H H′, all constructed and operating substantially as described.

4. In a coal and ore breaker, the combination of the hopper A, constructed in steps, picks B′ B^2 B^3 B^4, levers D D′, shafts E E′, cranks F F′, and eccentrics G G′, substantially as and for the purpose specified.

5. In a coal and ore breaker, the combination of the hopper A, picks B′ B^2 B^3 B^4, levers D D′, and shafts E E′, substantially as and for the purpose specified.

In testimony of which invention I hereunto set my hand.

PHILIP HENRY SHARP.

Witnesses:

C. S. WILLIAMSON,

ALBERT G. CUMMINGS.