

(No Model.)

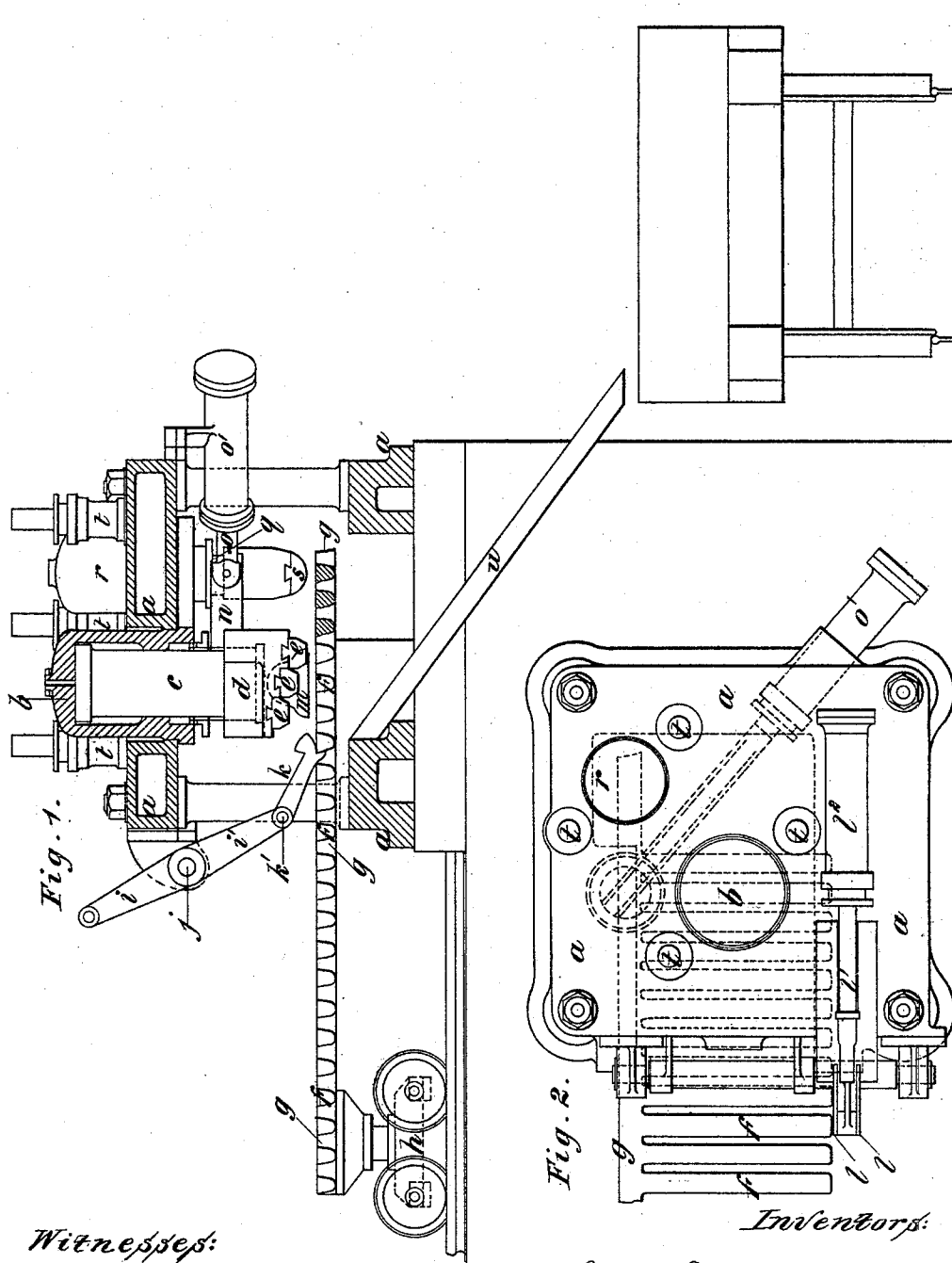
2 Sheets—Sheet 1.

E. P. MARTIN & E. JAMES.

MACHINERY FOR BREAKING PIG IRON AND LOADING SAME INTO WAGONS.

No. 498,805.

Patented June 6, 1893.



Witnesses:

H. A. Johnston.
Charles R. Searle.

Inventors:

Edward Pritchard Martin
Enoch James
by their attorney
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Fig. 3.

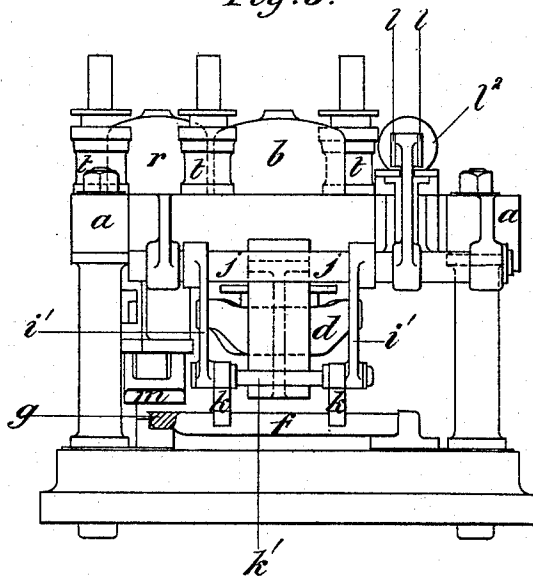
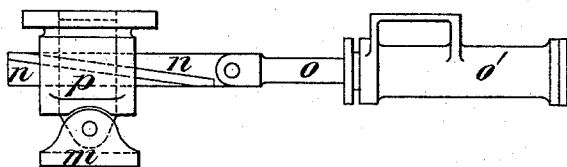


Fig. 4.



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UNITED STATES PATENT OFFICE.

EDWARD PRITCHARD MARTIN, OF DOWLAIS, AND ENOCH JAMES, OF
CARDIFF, ENGLAND.

MACHINERY FOR BREAKING PIG-IRON AND LOADING SAME INTO WAGONS.

SPECIFICATION forming part of Letters Patent No. 498,805, dated June 6, 1893.

Application filed August 20, 1892. Serial No. 443,641. (No model.) Patented in England July 29, 1891, No. 12,873.

To all whom it may concern:

Be it known that we, EDWARD PRITCHARD MARTIN, residing at Dowlais, and ENOCH JAMES, residing at Cardiff, England, subjects of the Queen of Great Britain and Ireland, have invented a new and useful Improvement in Machinery for Breaking Pig-Iron and for Loading the Same into Wagons, (for which we have obtained a patent in Great Britain, dated July 29, 1891, No. 12,873,) of which the following is a specification.

This invention consists, first, in a specially designed machine for separating from the sow and otherwise breaking a series of pigs raised together, as one mass, from the casting bed by a crane or like appliance, or other suitable means.

It consists further in apparatus for loading into wagons the pig iron thus broken.

The breaking machine which is preferably actuated by hydraulic power but may be worked by steam, compressed air or other motive agent, is constructed and arranged substantially as follows.

Carried in a frame bridging over a space between two walls or other suitable supports is a ram cylinder, the plunger of which works through the bottom of the said cylinder, and is fitted at its lower end with a head somewhat after the manner of the hammer-head of a steam hammer.

At that end of the machine at which the sow and adhering pigs are fed for breaking, is a pair of arms connected to a rocking shaft. These arms are fitted at their lower ends with pawls for advancing the mass to the ram aforesaid. When sufficiently advanced, the mass is clamped by a block operated by a wedge-shaped lever actuated by a separate ram. The plunger aforesaid is then lowered and as many pigs as the head has capacity for are thereby snapped off from the sow and also severed at or about midway. The pig-breaking ram plunger is then withdrawn and the clamping block raised. By the arms and pawls above mentioned the mass is again advanced and the process of clamping and breaking repeated.

Simultaneously with the second and subsequent downstrokes of the pig-breaking plunger, the plunger of a ram employed for break-

ing the sow descends upon that part of the latter from which the pigs have been separated by the immediately previous down stroke of the pig-breaking plunger. This said part of the sow is accordingly broken into lengths approximating to that of one half of a pig. These operations are repeated until the sow and the whole series of pigs are broken up. The pig-iron thus broken is precipitated on to a chute or inclined table preferably formed of heavy rails with longitudinal openings for sand to fall through, which chute may either be fixed or capable of movement on hinges. By this chute the iron is guided into wagons placed below for its reception.

In the accompanying drawings Figure 1 represents a vertical section, Fig. 2 a plan, and Fig. 3 a view at the feeding end of our improved machine as arranged by hydraulic operation for breaking pig-iron, and Fig. 4 is an elevation showing certain details detached. At Fig. 1 is illustrated also means we employ for loading the broken pig from the machine into wagons.

Similar letters of reference indicate like parts in all the figures.

Supported in a suitable frame *a* is a ram cylinder *b* the plunger *c* of which is furnished with a cross-head *d* fitted with three breaking hammer-heads *e*. The pigs *f* and sow *g*, raised as one mass from the casting bed, are supported at one end on a trolley *h*, (Fig. 1) and are directed to pass on bearers to the hammers *e*, (Fig. 1.)

The mass is fed to the hammers by the levers *i*, *i'*, carried on the rocking shaft *j*, the levers *i'* being connected at their lower ends to the shaft *k'* carrying pawls *k*. The lever *i* is connected at the upper end by the link *l* (Figs. 2 and 3), to the plunger *l'* of a ram cylinder *l''* by means of which it is operated to feed the mass forward to be broken. When, by the operation of the said plunger *l'*, the levers *i*, *i'* and the pawls *k*, the mass of iron is advanced to the requisite extent to commence breaking, it is clamped by the clamping block *m* which is lowered on to the sow by means of the wedge-shaped arm *n* connected to the plunger *o* of the ram cylinder *o'* by which the plunger *o* the arm *n* is thrust forward into an inclined slot made in the head *p* to which the

block *m* is connected. A detached view of the clamping device is shown at Fig. 4. The mass of iron having been clamped as aforesaid the plunger *c* of the ram cylinder *b* is then lowered and by the hammer heads *e* three pigs are successively snapped off from the sow and also severed at or about midway. The plunger *c* is then drawn up and the mass of iron is released by raising the clamping block *m*. The levers *i*, *i'* are then set in operation to feed the mass of iron farther forward and the operations of clamping and pig breaking are repeated. Simultaneously or nearly so, with the second and subsequent down-strokes of the plunger *c*, the ram *g* working in the cylinder *r* is lowered on to the sow *g* and that part thereof from which the pigs were removed in the immediately previous down stroke of the ram *c* is broken up by the hammer head *s* into lengths approximating to that of one half of a pig. The return or up-strokes of all the rams are obtained as usual by the provision of constant pressure rams *t*. The aforesaid operations are repeated until the sow and the whole series of pigs are broken up. The pig iron thus broken up descends on to a chute *u* by which it is delivered into wagons drawn up on rails in a hauling-way as seen in Fig. 1. As illustrated in the drawings the chute *u* is fixed. It may, however, be hinged at the upper end if desired, and be designed to be moved by hydraulic or other power so as to alter the angle of inclination at will and to be worked backward and forward over the wagons.

Instead of being operated by hydraulic power, the various plungers in the breaking machine may be actuated by steam or other suitable motive agent.

We claim as our invention—

1. In a machine for breaking pig-iron, a reciprocating hammer *e*, carrying two or more dies arranged step-wise so as to strike in succession during the descending motion, in combination with means as the lever *i'* and pawl *k* for feeding forward the iron at the proper period, all arranged for joint operation substantially as herein specified.

2. In a machine for breaking pig-iron, a reciprocating hammer *e* carrying two or more dies arranged step-wise so as to strike in succession during the descending motion, in combination with means as the clamp *m* for holding the iron during the operation of breaking it and releasing it to be fed forward during

the period while the hammer is up, and with means as the lever *i'* and pawl *k* for feeding forward the iron at the proper periods, all arranged for joint operation as herein specified.

3. In a machine for breaking pig-iron, a ram or hammer for breaking one or more pigs at each down stroke, a second ram or hammer for breaking the sow, a third ram for clamping the mass in position for the breaking, and a fourth ram and pawl for feeding the mass to the breaking ram, all combined and arranged to operate substantially as herein specified.

4. In a machine for breaking pig-iron, in combination with a reciprocating hammer and suitable bearers, adapted to support the pigs at a distance therefrom to facilitate the breaking, the feeding mechanism described consisting of the pawls *k*, pawl shaft *k'*, rocking shaft *j*, levers *i*, *i'*, and link *l*, actuated by the ram *l'* all arranged and operating substantially as hereinbefore described.

5. In a machine for breaking pig-iron, in combination with a ram carrying one or more hammers and bearers adapted to support pig-iron and to provide a long space unsupported, the device for clamping the material preparatory to breaking, consisting of the block *m* between which and a bearer the sow is gripped, and a wedge-shaped arm *n* working in a correspondingly shaped slot in the head *p* to which the block is suspended, the said wedge-shaped arm *n* being actuated by the ram *o* all substantially as herein described.

6. In a machine for breaking pig-iron a reciprocating hammer having stepped dies *e* adapted to break the pigs successively, a clamp *m* adapted to hold the mass firmly during the breaking action, and a feeding device *k* feeding forward the mass of iron during the period while the hammer and clamp are up, in combination with each other and with the chute *u* arranged below the breaking appliances adapted to receive the broken iron therefrom, and conduct it over a hauling-way for loading it upon cars or other vehicles, all arranged for joint operation substantially as herein specified.

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Witnesses:

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