

W. McCLAVE.
Grate.

No. 213,516.

Patented Mar. 25, 1879.

Fig 2.

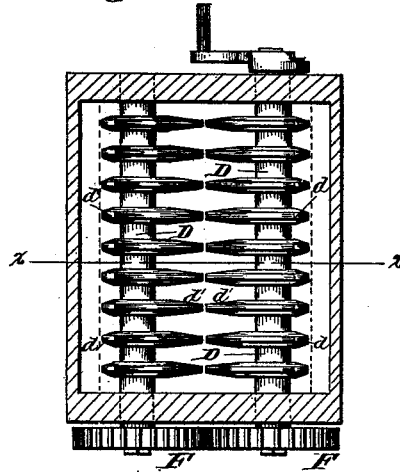


Fig 1.

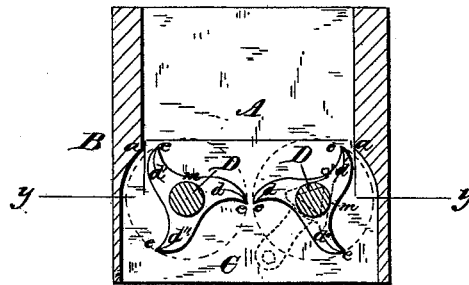


Fig 3.



Witnesses.

Harry King
William Blackstock.

Inventor.

Wm M. Clave,
His Atty.

UNITED STATES PATENT OFFICE.

WILLIAM MCCLAVE, OF PITSTON, ASSIGNOR OF ONE-HALF HIS RIGHT TO
JOHN A. PRICE, OF SCRANTON, PENNSYLVANIA.

IMPROVEMENT IN GRATES.

Specification forming part of Letters Patent No. 213,516, dated March 25, 1879; application filed
August 5, 1878.

To all whom it may concern:

Be it known that I, WILLIAM MCCLAVE, of Pittston, in the county of Luzerne and State of Pennsylvania, have invented a certain new and useful Improvement in Furnace-Grates; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section transverse to the grate-bars, taken in line *xx* of Fig. 2. Fig. 2 is a partial horizontal section in line *yy* of Fig. 1, and Fig. 3 is a longitudinal elevation of one of the grate-sections, a part of the same being broken away.

Similar letters of reference in the several figures denote the same parts.

This invention is an improvement upon that class of grates in which two rotary shafts, geared together, are provided with projecting curved arms, that support the fuel and furnish the means for dumping the ashes and cinders without allowing the coals to fall into the ash-pit beneath, and more particularly upon that form of grate described and shown in Letters Patent No. 202,449, granted to Price & McClave April 16, 1878; and the present invention consists, first, in the employment of reversible grate-sections having a central shaft and three sets of arms at substantially equal distances apart, said arms having ogee or reversed-curve outlines, or the equivalent thereof; secondly, in combining two geared sections of the character above referred to in such manner that the curvature of the arms on one shaft shall be the reverse of that of the arms on the other shaft; and, thirdly, in grate-sections of the character above referred to, having the arms made thicker at the middle or near the shaft than at the edges whereon the fuel is supported, substantially as I will now proceed to describe.

In the drawings, A is the fire-box of the furnace, B; C, the ash-pit; D D, the grate-shafts, suitably journaled and geared together by spur-gearing F, or the equivalent thereof. Each grate-shaft is provided with three sets of arms, *d d' d''*.

Referring to either of said shafts, the arms thereon are all curved or bent forward in the

same direction, either in curved lines, as shown, or in equivalent angular lines, and terminate at their outer ends in sharp angles or points *e e*, at substantially equal distances from each other, measuring around the circle, and all pointing in the same direction around the circle of the same shaft, but the arms of one shaft curved or pointed in an opposite direction to the corresponding arms of the other shaft, so that when the two shafts are arranged in the furnace, as shown in Fig. 1, the arms above the line of the shafts will present their cutting-edges inward or toward each other, and the arms below the line of said shafts will present their cutting-edges outward or away from each other, for reasons hereinafter stated. The grate-shafts and their arms will, thus, when seen in cross-section or end elevation, as in Fig. 1, be each bounded by three reversed curved lines, or the equivalent thereof, the lines being so arranged that each arm will be concave on its front and convex on its rear side and outer end, the lines of convexity and concavity meeting to form the cutting edges or points *e*.

The normal position of these grate-bars is as shown in Fig. 1, the arms *d' d'* extending outward and upward to, or nearly to, the lower outer edges of the fire-box, so as to hold the coals from lateral escape around or over the grate, the arms *d d* coming nearly or quite together near the middle of the fire-box, in a line substantially horizontal, so as to support the coals at that point, and the arms *d'' d''* extending downward beneath and serving to strengthen the shafts. The ashes and cinders are dumped by turning the arms *d d* downward, so as to open a sufficient space for them to fall through, and, by the same movement of the shafts, the arms *d' d'* are projected forward under the live coals, preventing them from falling with the ashes. When the ashes have been dumped the arms *d' d'* are, by a further movement, brought to the original position of the arms *d d*, and the latter are moved downward to the original position of the arms *d'' d''*, where they cool off before coming in contact with the burning coals.

As the arms are obliged to move only one-hundred and twenty degrees in order to dump the ashes and reset the grate, the operation

is performed more easily and readily than with the old forms of grates, where they were obliged to move one hundred and eighty degrees or more. The grate-shafts can be set at a farther distance below the corners *a a* of the fire-box, inasmuch as the lateral arms incline upward more steeply than in the old forms of grate, and the said steeper inclination tends to direct the lower contents of the fire-box inward toward the center and to cause the arms to move more horizontally, and therefore to exert less lifting power on the said contents during the operation of dumping.

In this part of my invention I limit myself to the combination of two shafts, each having the three sets of arms, and so disposed on each side of the central line of the furnace as that a large space can be opened between them by rotating them to the proper point, through which space the cinders and ashes can be dumped at the middle of the furnace into the ash-box below, the coals outside of the grate shafts being meanwhile supported and prevented from dumping by the action of the outside arms, which rise under and hold them in position, the arms of one shaft being curved or pointed in an opposite direction from those of the other shaft, and being so arranged that when raised above the line of the shafts their pointed or cutting edges will face inward from both sides of the furnace, enabling them to easily cut and cleanly separate the residuum or burnt-out portions of the fuel from the live coals, and to dump into the ash-box the portions thus cut off or separated without permitting the live coals to fall through.

In the second part of my invention I cast the arms with their inner lateral edges slightly raised above the surface of the shafts, as shown at *m m*, whereby the weight of the coals will be supported upon said projecting edges, and thereby held away from the shafts, by means of which construction the shafts are strengthened and are protected from direct contact with the burning coals and rendered more durable and less liable to warp. The arms are also made thicker along the lines *v v* than at the edges, whereby their strength and durability are increased, and the actual surface in contact with the coals is diminished, thus giving freer draft and less obstruction to the combustion of the lower strata of fuel.

The arms in this form may be molded from a three-part or a two-part pattern. The grate-

shaft and arms are preferably cast in one piece, though they may be made in sections, bolted or applied on a central rod and clamped together.

As compared with that class of grates in which the shafts or bars are provided with four sets of arms at right angles to each other, my improved device has the great advantage that in it no set of arms is projected upward into and held in the mass of burning coals, thereby interfering with their combustion and becoming quickly oxidized and destroyed; but when set to hold the fuel the upper surface is clear of all projections or obstructions.

It also has the advantage that the inclination of the arms which hold the fuel is slightly downward from the sides toward the middle of the fire-box, thereby tending to direct the fuel toward the center.

The use of three sets of arms in contradistinction to two or four sets is thus of great practical importance, and when the arms are made in the curved shape shown in the drawings, or the substantial equivalent thereof, its advantages in properly holding the fuel, in preventing the coals from falling between the grate-bars and sides of the fire-box, and in facilitating the dumping of ashes and clinkers without dropping the burning coals are greatly increased.

I claim as my invention—

1. Reversible grate-sections having a central shaft and three sets of arms at equal distances apart, said arms having ogee or reversed-curve outlines, or the equivalent thereof, substantially as described.

2. The combination, in a furnace-grate, of two geared reversible sections, each having a central shaft and three sets of curved arms, arranged at substantially equal distances apart, as described, the curvature of the arms on one shaft being the reverse of that of the arms of the opposite shaft, as herein set forth.

3. Reversible grate-sections having a central shaft and three sets of arms, at substantially equal distances apart, formed with the reversed curves, as described, said arms being made thicker at the middle or near the shaft than at the edges whereon the fuel is supported, substantially as described.

WM. MCCLAVE.

Witnesses:

J. A. PRICE,
GEO. H. ULMER.