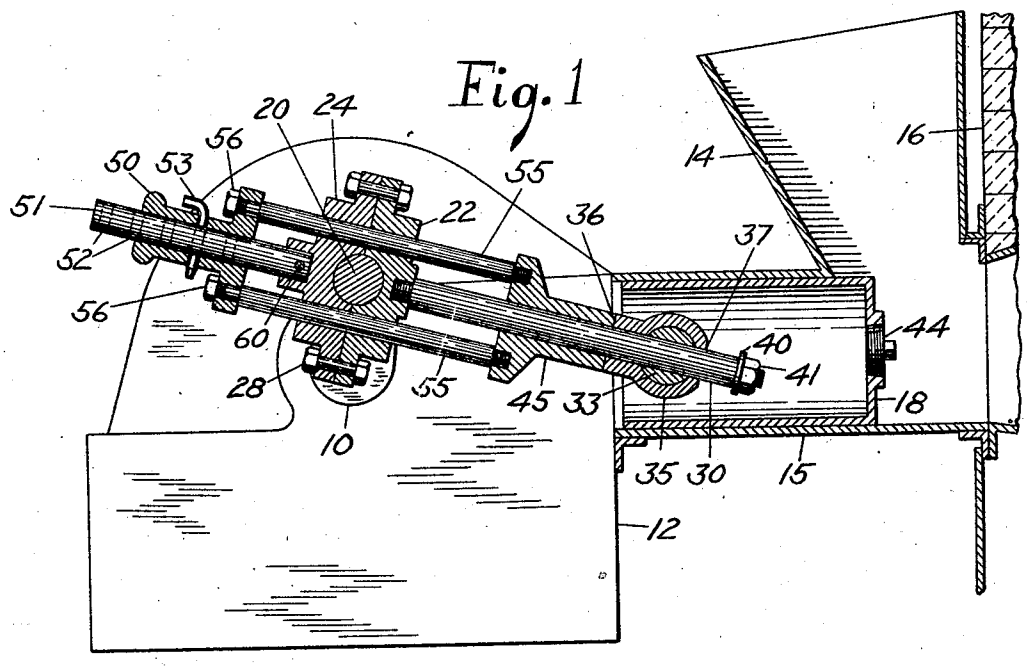
Jan. 29, 1929. 1,700,710

C. H. RICH.

FUEL FEEDING MECHANISM

Filed Dec. 8, 1926

Fig. 1



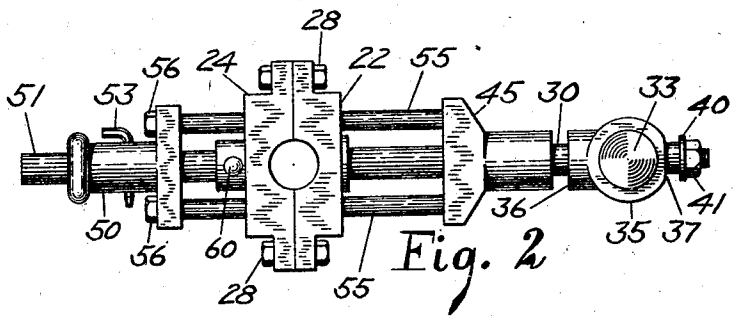


Fig. 2

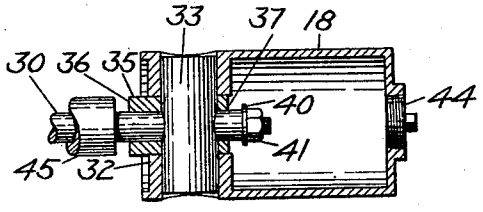


Fig. 3

WITNESS

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Patented Jan. 29, 1929. 1,700,710

UNITED STATES PATENT OFFICE.

CARL H. RICH, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO RILEY STOKER CORPORATION, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

FUEL-FEEDING MECHANISM.

Application filed December 8, 1926. Serial No. 153,372.

This invention relates to automatic stokers, and more particularly to stokers of the type in which a reciprocating ram pushes fuel into the furnace.

In stokers of this type it is at times advisable to provide means for varying the length of the ram stroke in order to control the rate of fuel feed. Devices have been constructed for this purpose in the past, but certain inherent defects have always existed in these prior arrangements. For example, one form of construction comprises a connecting rod pivoted to the ram and arranged to slide through a block rotatably mounted on a crank of a driving crankshaft. Collars are mounted on the rod to form abutments against which the block will strike, the outer collar being adjustable along the rod to vary the amount of lost motion and the stroke of the ram. With such an arrangement, the connecting rod is not in line with the force which it transmits, for it passes through the block at one side of the crank bearing. This results in an eccentric loading of the rod, and as the forces encountered are frequently of great magnitude, there is serious danger of the rod becoming broken. Moreover, in this type of construction the ram is always pushed in to the same position, and withdrawn to a variable position depending upon the collar adjustment. When this adjustment is made for a short stroke, the ram is at all times largely beneath the hopper, thus greatly increasing the opportunity for coal to arch across the hopper above the ram and fail to drop in front of the ram on its outward stroke.

In another type of construction, the connecting rod is pivotally joined to a crank of the driving crankshaft and arranged to slide through a block rotatably mounted on the ram. Collars are mounted on the rod to limit this sliding movement, the outer collar being joined to the rod by a pin passing through the two members. Several holes are provided in the rod in order to permit the outer collar to be mounted at various positions along the rod, thus allowing an adjustment of the ram stroke. The adjusting pin is usually relatively weak, and is intended to fail in shear and thus prevent damage to the driving mechanism if the ram encounters an exceptional resistance. This occurs rather frequently, usually being caused by a block of wood, or other foreign material, in the coal. Since the pin is located between the ram and the crankshaft in such a construction, it is necessary to reach over the top of the rotating crankshaft in order to replace the shearing pin or to adjust the length of stroke of the ram. This is not only inconvenient but also highly dangerous to the operator.

It is accordingly the main object of my invention to overcome such difficulties and to provide a fuel feeding mechanism for a stoker which will drive the ram through an adjustable stroke and in which the adjusting device is located at a point easily accessible to the operator.

A further object is to construct a stoking mechanism by which the fuel feeding ram may be withdrawn always to the same position and pushed inwardly to a variable position, whereby the tendency of the fuel to arch over in the hopper is minimized.

Another object is to provide a ram reciprocating mechanism with a safety device comprising a yieldable member which is so located that it may be conveniently and safely replaced without stopping the crankshaft.

With these and other objects in view, as will be apparent to one skilled in the art, my invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

In accordance with my invention, I provide a stoker ram reciprocating mechanism which has a driver, such as a crankshaft, connected to the ram by means of an adjustable device so arranged that it may be moved to vary the effective fuel feeding effect of the ram. This is accomplished by adjusting the length of the stroke of the ram, and the parts are preferably so arranged that the ram may be moved outwardly to a fixed position and inwardly to a variable position so that the ram will be entirely withdrawn from beneath the hopper on the outward stroke and thus obviate the possibility of coal arching over the ram in the hopper. Such a construction may involve an adjustable lost motion connection between the ram and the connecting rod which is pivotally attached at its other end to the crankshaft, the lost motion permitting the connecting rod to move periodically through a fixed cycle while the ram moves inwardly only as far as desired. A primary feature of my inven-

tion is to provide a device which makes it possible to change the relative positions of the adjustable parts of the lost motion connection by means of a control member located at the front of the stoker in a freely accessible position. A further feature includes a safety device arranged to yield under an excessive load on the ram, which may comprise a frangible member, such as a shearing pin, connecting two separate parts, and this frangible member is likewise located in or controlled from an easily accessible position.

Referring to the drawings, in which like reference numerals indicate like parts:

Fig. 1 is a sectional side elevation of a stoker comprising one embodiment of my invention, the section being taken through the center of the ram;

Fig. 2 is a side elevation of the connecting rod and wrist pin removed from the stoker; and

Fig. 3 is a horizontal section through the center of the ram showing the method of joining the connecting rod thereto.

The embodiment of my invention illustrated in the drawings comprises a suitable driver, shown in the present instance as a rotatable crankshaft 10, which may be driven from any desired source of power. The crankshaft is mounted in suitable bearings in a gear box 12, which as will be understood contains the requisite mechanism for transmitting power to the crankshaft. The fuel feeding device, driven from this crankshaft, may comprise a fuel hopper 14 located above a ram casing 15 adjacent to the wall 16 of a furnace. Fuel from the hopper falls in the path of a reciprocable ram 18, and is thereby pushed into the furnace. The ram is preferably cylindrical, as illustrated, and adapted to reciprocate in a substantially horizontal path, being guided in its movement by the surrounding parts of the ram casing 15.

The ram is driven from the crankshaft 10, and the driving connection is preferably so arranged that the effective fuel feeding capacity of the ram may be varied as desired without altering the speed of rotation of the crankshaft. This may be accomplished by suitably varying the length of stroke of the ram, as by means of a lost motion connection which is preferably so arranged as to withdraw the ram to the same position each time, thus providing an ample space into which fuel may fall from the hopper. I preferably utilize a connecting rod comprising two relatively adjustable parts arranged to provide a variable amount of lost motion which may be manually adjusted from the front of the stoker mechanism.

In the construction illustrated, one part of the connecting rod is pivotally connected to the cylindrical crank pin 20 on the crankshaft. For convenience in manufacture and assembly, this part of the rod comprises a number of separate members, including a box 22 and cap 24 surrounding the crank pin and held together by bolts 28.

In order to permit lost motion, the connecting rod is arranged to move relative to the ram, preferably by a slidable joint. For this purpose, the inner rod 30 is suitably attached to the box 22, as by screw threads, so that it is rigid therewith. The ram is provided in its interior hollow portion with suitable bosses 32 bored to pivotally receive a wrist pin 33. This wrist pin has a transverse opening arranged to slidably receive the inner end of the rod 30. A yoke 35 surrounds the central portion of the wrist pin, being provided with a bore through which the rod 30 may slide. This yoke provides an enlarged bearing surface for the rod and suitable shoulders 36 and 37 by which the ram may be driven.

In order to drive the ram, it is necessary to limit the sliding movement of the connecting rod relative thereto, and for this purpose I provide two abutments on the rod. I prefer to arrange a fixed abutment on the inner end of the rod, whereby the ram may be withdrawn to the same position at each rotation of the crankshaft. Such an abutment may be formed by a washer 40 held against a shoulder on the rod by a nut 41. A threaded plug 44 may be provided in the working face of the ram to permit assembly of these parts. An adjustable abutment is provided to push the ram inwardly toward the furnace through the length of stroke desired. This abutment may be formed by the second part of the connecting rod, adjustably attached to the first mentioned part. This may comprise a block 45 arranged to slide, for adjustment, on the rod 30 between the box 22 and the yoke 35.

For the convenience and safety of the operator, this adjustment is made at an easily accessible point and preferably from a position in front of the rotating crankshaft, whereby any danger of personal injuries to the operator is eliminated. For this purpose I arrange a control member or adjusting head 50, which may be slidably mounted on an outer rod or post 51 attached to cap 24 and projecting outwardly therefrom in a direction substantially in line with the inner rod 30. This post may have a number of spaced transverse holes 52, and the control member 50 may be located as desired relative to the post by means of an adjusting pin 53, which as will be understood is removed when making an adjustment. It is necessary to connect the control member 50 with the abutment 45, and for this purpose I prefer to utilize two rods 55, one of which passes on each side of the crankpin. By this means the device is made symmetrical, and eccentric loading is avoided. These rods are

shown threaded into block 45 and attached to the control member by nuts 56, and are preferably arranged to slide freely through bores in the box 22 and cap 24, thus permitting a compact assembly.

It is desirable to provide a member which will yield in case the ram encounters an obstruction, and thus prevent damage to the driving mechanism. It is apparent that the pin 53 might be utilized for this purpose, but I prefer to arrange a separate yieldable member. In the embodiment illustrated, this member consists of the shearing pin 60, which is utilized to attach the outer rod 51 to a boss on the cap 24. During the inward stroke of the ram, the rod 51 tends to pull away from the cap, and the pin 60 is placed in shear. The pin is so dimensioned that it will yield before the other parts of the mechanism are overloaded.

The operation of the invention will now be apparent from the above disclosure. Coal or other fuel is placed in the hopper 14. The crankshaft 10 is rotated by a suitable source of power connected to the gear box 12. On the inward stroke, the rod 30 slides through the yoke 35 and the wrist pin 33 until the block 45 strikes against the yoke, thus causing the ram to push coal into the furnace. On the outward stroke, the connecting rod slides relative to the ram until the washer 40 strikes the yoke and causes the ram to be withdrawn. The position of block 45 and hence the ram stroke can be adjusted by withdrawing the pin 53 and sliding the head 50 along the slowly moving rod 51 and then replacing the pin in the desired hole. This is done during the outward stroke of the ram when no force is exerted on the parts to be adjusted, and since they are in front of the crankshaft the adjustment may be made safely and easily. If the pin 60 should shear when an obstruction is met by the ram, a new pin may be easily replaced on the outward stroke of the ram, it being observed that there is a direct draw bar connection 30 between the crankshaft head and the ram, and that all other parts of the mechanism are freely adjustable at this time. It will therefore be apparent that I have provided a simple construction with freely accessible adjustment parts which may be safely and quickly adjusted as desired and which will operate efficiently to move coal into the furnace at the required rate of feed.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A stoker comprising a reciprocable ram arranged to feed fuel into a furnace, a driver therefor, means connecting the driver and the ram including an adjustable member located near the ram which is movable to vary the length of the ram stroke, and means located in a freely accessible position in front of the driver for changing the adjustment of said member.

2. In a stoker, a reciprocable ram arranged to feed fuel into a furnace, and a reciprocating mechanism therefor comprising a driving member, means connecting the ram and the driving member which is movable relative to the ram to provide a limited degree of lost motion, and means freely accessible at the front of the stoker to limit the extent of such relative movement and thereby control the length of stroke of the ram.

3. A stoker comprising a reciprocable ram, a driving mechanism therefor including a revoluble crankshaft, means connected to said crankshaft to push the ram inwardly to a variable position and means controllable from a position in front of the driving crankshaft for adjusting the length of the ram stroke.

4. In a stoker having a reciprocable ram, a driving mechanism therefor comprising a driver, a connecting rod between the driver and the ram arranged to slide relative to the ram through a limited degree of lost motion, and means controllable from a freely accessible position in front of the stoker to limit such sliding movement and so vary the length of stroke of the ram.

5. In a stoker, a reciprocable ram arranged to feed fuel into a furnace, a driver, a connecting rod between the driver and the ram having two relatively adjustable parts, one part being operatively connected to the driver and the other to the ram and freely accessible means for adjusting the relative positions of said parts and thereby varying the effective fuel feeding capacity of the ram.

6. In a stoker having a fuel feeding ram, a reciprocating mechanism therefor comprising a driver, a connecting rod having two independent relatively adjustable parts, one of which is adjustably connected to the driver and moves the ram in one direction and the other of which is connected to the driver and moves the ram in the opposite direction and freely accessible means associated with that part which is adjustably connected with the driver for fastening the same in a desired adjusted position.

7. In a stoker, a rotatable crankshaft, a reciprocable ram, a connecting rod joined to said crankshaft and arranged to slide through a limited degree of lost motion relative to said ram, and means for limiting the sliding movement of the connecting rod relative to the ram, comprising an adjustable member located in front of the crankshaft.

8. In a stoker, a rotatable crankshaft, a reciprocable ram, a connecting rod joined to the crankshaft and arranged to slide relative to said ram, abutments on said rod to limit the sliding movement of the rod relative to the ram, one of said abutments being capa-

ble of adjustment, and means for making said adjustment from a position in front of the crankshaft.

9. In a stoker, a rotatable crankshaft, a reciprocable ram, a connecting rod pivotally mounted on said crankshaft and arranged to slide relative to said ram, a fixed abutment adjacent to the inner end of said rod to limit the sliding movement of the rod relative to the ram on the outward stroke, an adjustable abutment on said rod to limit sliding movement of the rod relative to the ram on the inward stroke, and means adjacent to the crankshaft for controlling the position of said adjustable abutment.

10. In a stoker, a rotatable crankshaft, a reciprocable ram, a connecting rod pivotally mounted on the crankshaft and arranged to slide relative to the ram, a fixed abutment adjacent to the inner end of said rod to limit sliding movement of the rod relative to the ram on the outward stroke, an adjustable abutment on said rod to limit sliding movement of the rod relative to the ram on the inward stroke, means to permit said adjustable abutment to yield if the ram encounters an exceptional resistance, and means adjacent to the outer end of said rod for controlling the position of said adjustable abutment.

11. In a stoker, a rotatable crankshaft, a fuel hopper, a reciprocable ram for feeding fuel from said hopper into a furnace, a wrist pin pivotally mounted in said ram and provided with a transverse bore, a connecting rod pivotally mounted on said crankshaft and comprising an inner rod slidable through said wrist pin and an outer rod provided with spaced transverse holes, a fixed abutment adjacent to the inner end of said inner rod, a block slidable on said inner rod between said wrist pin and said crankshaft, an adjusting head slidable on said outer rod, a pin to locate said adjusting head as desired, and means connecting said adjusting head with said slidable block.

Signed at Worcester, Mass., this 6th day of December, 1926.

CARL H. RICH.