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A. L. SMITH.

PEEP HOLE ATTACHMENT FOR BLAST FURNACES.

APPLICATION FILED MAR. 5, 1903.

NO MODEL.

Fig. 2.

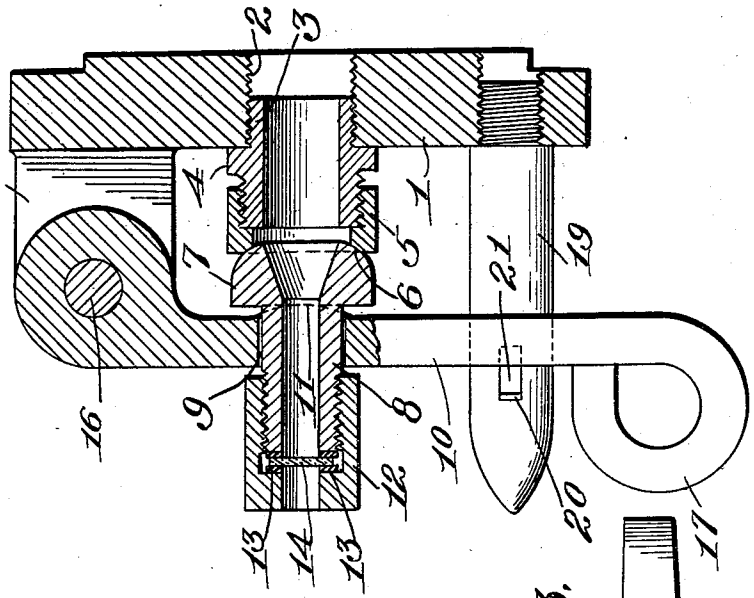

Fig. 3.

Fig. 1.

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UNITED STATES PATENT OFFICE.

ADAM LILLIE SMITH, OF PITTSBURG, PENNSYLVANIA.

PEEP-HOLE ATTACHMENT FOR BLAST-FURNACES.

SPECIFICATION forming part of Letters Patent No. 742,919, dated November 3, 1903.

Application filed March 5, 1903. Serial No. 146,335. (No model.)

To all whom it may concern:

Be it known that I, ADAM LILLIE SMITH, a subject of the King of Great Britain, (but having declared my intention of becoming a citizen of the United States,) residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Peep-Hole Attachments for Blast-Furnaces, of which the following is a specification.

This invention relates to peep-hole attachments for blast-furnaces.

The object of the invention is in a ready, simple, thoroughly-feasible, and practical manner to seal the pricking-rod opening against possibility of escape of air or gases and at the same time to provide efficient means by which the twyer-nozzle may be inspected to ascertain whether it is free from any accumulation of slag or other material, thus to enable the workman always to know positively that the twyer is properly working; furthermore, to provide for ready repairs of any parts that may be worn without entailing serious loss of time by stoppage of the furnace and attendant danger of cooling.

The device of the present invention embodies, generally stated, a cap or plate to be secured to the twyer. At a point in the cap, preferably centrally thereof, is a threaded opening, in which is seated a bushing, preferably of hard metal, and to this bushing is detachably connected a seat, preferably of bronze, the seat being adapted to be engaged by a plug or closure carried by a pivoted shackle and having its outer end provided with an eye-sight, the plug, seat, and bushing, where the parts of the device are locked together, forming a continuous passage by which inspection through the eye-sight may be had of the interior of the furnace. In addition to the above there is provided a locking-wedge which operates positively to force the plug against the seat, and thus effect an air-tight seal between the parts.

The invention consists, further, in the novel construction and combination of parts of a peep-hole attachment for blast-furnaces, as will be hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this specification, and in which like characters of reference indicate corresponding parts, there is illustrated one form of embodiment of the invention capable of carrying the same into practical operation, it being understood that the elements therein exhibited may be varied or changed as to shape, proportion, and exact manner of assemblage without departing from the spirit thereof.

In the drawings, Figure 1 is a view in front elevation exhibiting the peep-hole attachment constructed in accordance with the present invention. Fig. 2 is a view in plan, partly in section. Fig. 3 is a view in side elevation of the locking-wedge for forcing the plug against the seat.

Referring to the drawings, 1 designates a cap or plate adapted to be secured to the twyer-stock of a furnace in any suitable manner, as by bolts passing through suitable orifices at its ends. The plate is provided with a threaded opening 2, disposed in this instance concentrically thereof, in which is seated a bushing 3, preferably of hard metal, such as steel, the bushing being provided intermediate of its ends with a polygonal flange 4 to be engaged by a wrench when the device is being positioned on the cap, the said flange also serving to limit the insertion of the bushing in the orifice of the cap. The upper portion of the bushing is provided with external threads to be engaged by a seat 5, preferably of bronze, the upper or outer face of which is provided with a dish-shaped depression 6 to be engaged by the rounded head of the plug 7. The bushing, seat, and plug are each provided with a central bore, which, when the parts are in operative position, present a continuous passage-way to permit inspection of the interior of the twyer. The bore or opening of the seat 5 is larger than that of the bushing 3 for a purpose that will presently appear, and the bore of the plug is for a major portion of its length somewhat constricted and flares outward at the point where it enters the head and is at that point of the same diameter as the bore of the seat, or, if preferred, it may be made somewhat larger. The object for making a portion of the bore constricted is to reduce the pressure on the eye-sight glass, presently to be described, and also as far as possible to preclude entrance of slag or dust into the shank of the plug,

which would soon operate to render it obscure, and thus prevent the workman from inspecting the interior of the furnace or the twyer. The shank 8 of the plug is threaded throughout a portion of its length, and the unthreaded portion thereof, or that adjacent to the head 7, fits in a seat 9, formed in a pivoted shackle 10, the object for thus loosely mounting the shank of the plug within the shackle being to insure that it will automatically adjust itself to the seat when the two parts are brought into contact. The shackle is provided at the point where it contacts with the outer side of the head with a bulged or bellied portion 11, which will operate to effect square seating of the plug upon the seat. The outer or threaded portion of the shank of the plug carries a cap 12, which is internally threaded to engage the plug, and between the end of the plug and the inner wall of the cap there are arranged a pair of refractory rings 13, preferably of asbestos, between which is clamped the eye-sight glass 14.

The shackle is hinged between two ears or bosses 15, carried by the cap, a bolt 16 serving to hold the parts assembled. The outer or free end of the shackle is provided with a loop 17, and adjacent thereto is an orifice 18, adapted to straddle a stud 19, detachably connected with the cap, as by a threaded union. The stud is provided with a transverse orifice 20, preferably rectangular in cross-section, to be engaged by a wedge 21, which, when the shackle is in the position shown in Fig. 2, is driven through the orifice 20 and bears upon the shackle, and thus forces the plug rigidly against the seat 5, presenting thereby a gas-tight joint. By permitting the plug to have limited free play within the orifice of the shackle within which it is disposed and by coaction between the head 7 and the bulged portion 11 of the shackle accurate seating of plug will always be assured.

The advantages of this form of peep-hole attachment over those in ordinary use are that where the seat becomes worn from the pricking-rod, which is employed for clearing out the nose of the twyers, but slight expense and loss of time results and no stoppage of the furnace is necessary to remove such worn seat and replace it with a new one. When it is necessary to provide a new seat for one that is worn, the plug is thrown out of engagement therewith, and a closure of any suitable material is driven into the bore of the bushing, thereby preventing any escape of gas, dust, or slag from the twyer while a new seat is being supplied. As the said closure must tightly fit in the bore of the bushing, it will be obvious that in order to permit removal of a worn seat and its replacement by a new one its bore should be of larger diameter than the closure, and it is for this reason that the difference in diameter between the bore of the seat and the bushing is made, as before pointed out. The threads of the bushing that are engaged by the seat are quick-setting in order that no unnecessary time will be lost in furnishing a new seat when necessary. If the plug becomes damaged, all that is necessary will be to loosen the nut 22 of the bolt 16, remove the latter and detach the shackle and supply a new "eye-sight," under which generic term is included the plug, the cap 12, and the sight-glass. Should the shackle and eye-sight or peep-hole attachment become damaged, these may be readily replaced in a manner that will be perfectly obvious.

By the employment of this attachment ready inspection of the twyer and the interior of the furnace may always be had, and the danger heretofore present in clearing out the peep-hole is entirely eliminated. When the device as a whole becomes worthless, it may be readily removed from the twyer-stock and a new one substituted therefor.

All of the parts of this invention are constructed with a view to certainty of operation, high service, and durability in use and readiness of repairs when necessary. The parts may be made in standard sizes, so that when necessary one or more parts may be ordered and readily applied to position.

Having thus described the invention, what is claimed as new is—

1. An attachment of the class described, comprising a plate, a detachable seat carried thereby, a hinged member carrying an eye-sight provided with a head, and means for forcing the head against the seat.

2. An attachment of the class described, comprising a plate, a detachable countersunk seat carried thereby, a hinged member carrying an eye-sight provided with a head to engage the seat, and means for forcing the head against the seat.

3. An attachment of the class described, comprising a plate, a bushing carried thereby, a seat detachably connected with and having its bore of greater diameter than that of the bushing, thereby to permit plugging of the bushing to prevent escape of gas, &c., when removal of the seat is necessary, a hinged member carrying an eye-sight provided with a head to engage the seat, and means for forcing the head against the seat.

4. An attachment of the class described comprising a plate, a seat detachably supported thereby and having a dished depression, a hinged shackle carrying a plug provided with a rounded head to engage the depression and having its outer end provided with an eye-sight, and means for locking the plug in coöperative relation with regard to the seat.

5. An attachment of the class described comprising a plate, a bushing carried thereby, a seat carried by the bushing, a shackle hinged to the plate, and an eye-sight loosely mounted in the shackle and provided with a head to engage the seat.

6. An attachment of the class described comprising a plate, a bushing detachably connected therewith, a seat detachably connected with the bushing, a shackle hinged to the

plate, an eye-sight loosely mounted in an opening in the shackle and provided at one end with a rounded head to engage the seat, and at the opposite end with an eye-sight, and means for locking the shackle against movement.

7. A device of the class described comprising a plate, a seat carried thereby, a shackle hinged to the plate and carrying an eye-sight provided with a head to engage the seat, a stud carried by the plate and adapted to project through the shackle and having a transverse orifice, and a locking-wedge to engage the orifice.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ADAM LILLIE SMITH.

Witnesses:
WILLIAM J. MCCALLUM,
SAMUEL HANNAH.