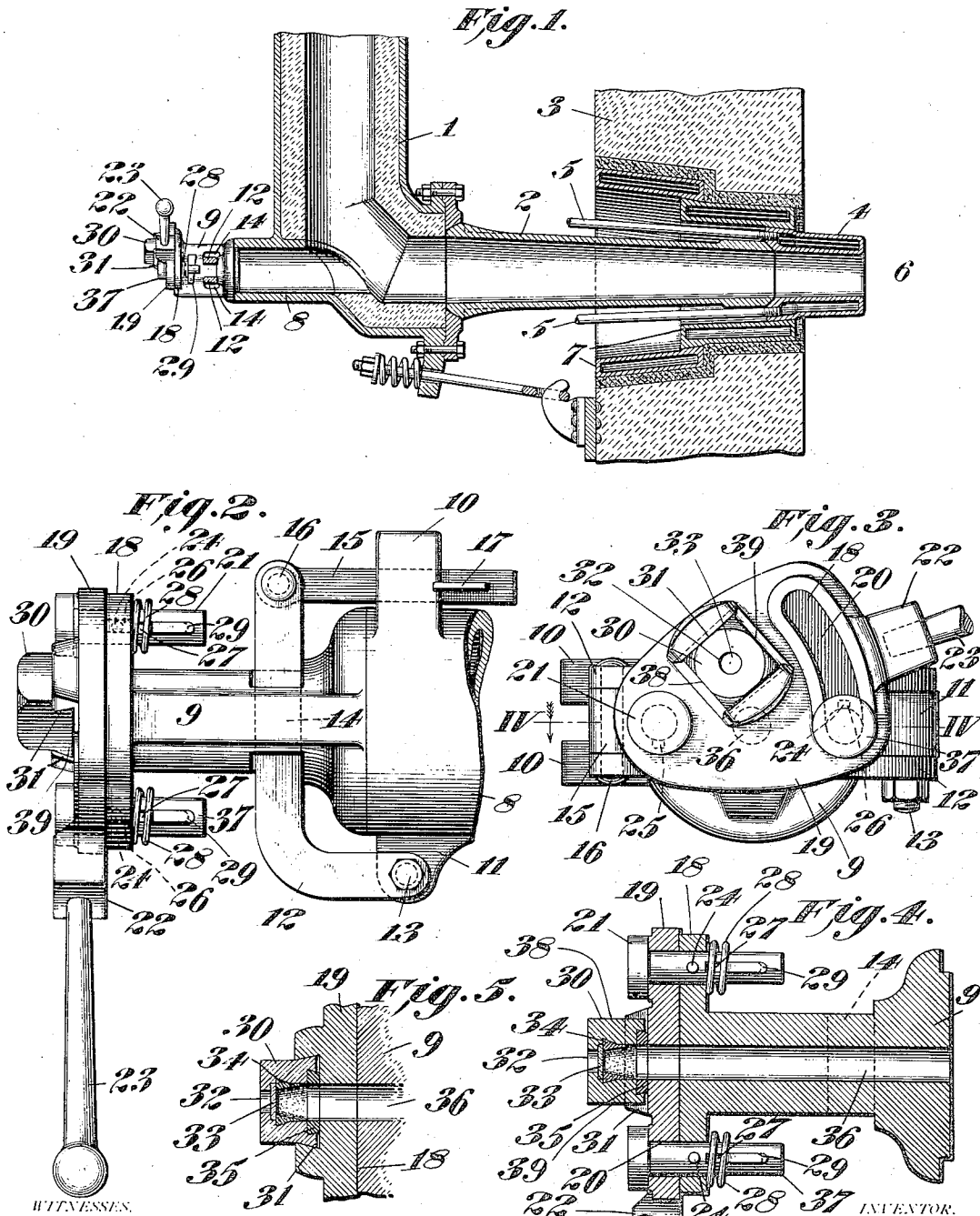


J. V. SYMONS.
 TWYER SIGHT FOR BLAST FURNACES.
 APPLICATION FILED MAY 22, 1911.

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Patented Oct. 10, 1911.



WITNESSES.

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UNITED STATES PATENT OFFICE.

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TWYER-SIGHT FOR BLAST-FURNACES.

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Application filed May 22, 1911. Serial No. 628,721.

To all whom it may concern:

Be it known that I, JOHNSON V. SYMONS, a citizen of the United States, residing in the borough of Westmont, in the county of Cambria and State of Pennsylvania, have
5 invented certain new and useful Improvements in Twyer-Sights for Blast-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the
10 invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to twyer sights for blast furnaces or for similar apparatus, and
15 consists generally of an arrangement which provides a colored or colorless glass as desired, whereby the interior of a furnace may be viewed without subjecting the eye of the observer to the blasts of air, dust or other
20 inconveniences.

My improved twyer sight is simple in application and operation and at the same time is safe, tight and easily repaired or replaced.

In order that a free and unobstructed
25 view may be had through the twyer sights, elbow pipe, and connections, it is generally essential to blow the dust out of the same prior to looking, by opening the cap at the end containing the glass, and it is also frequently
30 necessary to clean the glass by wiping it or washing it. In the older forms of twyer sights with which I am familiar, this operation of blowing out the dust and cleaning the glass is awkward and dangerous, as
35 with certain constructions the operator is likely to forget to shut off the blast pressure before taking off the peep cap which contains the sight glass, in which case the blast and dust will issue with great force and in
40 such a way as to burn the operator, or under extreme conditions will destroy his eyesight. In addition to this the older forms of twyer sights, which are provided with
45 plug valves, generally allow the blast to escape through indirect or tapered openings whereby hot particles of dust or larger particles of the furnace charge are thrown therethrough in various directions, thus
50 causing trouble and danger to the operators and other attendants.

One of the objects of my invention is to provide an apparatus whereby the difficulties and dangers above-mentioned will be obviated by reason of my construction, there-
55 by conducing to, or preserving safety of, the operator and other persons.

Another object of my invention is to provide a twyer sight, the opening from which is normally closed, when the sight is not
60 needed, thereby protecting the glass from the hot blast, the cutting action of solid particles carried thereby, and preventing the accumulation of dust or dirt on or against the same.

Another object of my invention is to provide a twyer sight, the glass of which is
65 normally away from the direct heat of the blast or the radiated heat from the furnace, thereby preserving it, while at the same time, the construction is so adapted, that a
70 slight movement on the part of the operator will bring the sight glass into position for use opposite the opening in the blow pipe. My twyer sight is operated from the
75 side of the blow pipe so that the operator does not have to stand in front of the blow pipe or the axis thereof, and this is therefore another means of insuring his safety.

Further objects of my invention will be described and referred to hereinafter.

Referring now to the sheet of drawings accompanying this specification and in which like figures refer to like parts:—Figure 1 is a vertical cross-sectional elevation
80 showing my improved twyer sight attached to an elbow twyer pipe, together with the blow pipe, twyer and a portion of the blast furnace wall. Fig. 2 is a top plan view of my improved device on a larger scale also
85 showing the manner of attaching it to the elbow twyer pipe. Fig. 3 is a front elevation of my improved twyer sight with the peep hole closed. Fig. 4 is a longitudinal
90 section taken on the line IV—IV of Fig. 3, but showing my twyer sight in its open position registering with the opening in the blow pipe. Fig. 5 is a cross section of the
95 outer portion of my device taken at right angles to the section of same shown in Fig. 4.

Referring now to the various figures of reference on the drawings:—The elbow
100 twyer pipe of the blast furnace is indicated at 1, to which is secured the blow-pipe 2, connecting with an opening in blast furnace wall 3, said blow-pipe being connected in
105 the usual manner to the twyer 4, which latter is provided with cooling breasts 7 and further provided with customary cooling pipes 5.

The interior of the blast furnace is indicated at 6. At the lower end of the elbow

twyer pipe 1, is formed the reduced pipe 8, the axis of which is in substantial line with the axis of the blow-pipe 2 and that of the twyer 4.

5 The main body-portion of my improved twyer sight is indicated at 9. The reduced pipe 8 is provided with two projecting fastening lugs 10, and on the opposite side with a projecting hinge lug 11. The pair of latch
10 rods 12, which are preferably of bent form as shown, are pivotally secured to the hinge lug 11 by means of the hinge bolt 13, and pass through openings 14 in the body casting 9 as shown, in addition to which they are
15 provided with a locking rod 15, pivotally secured to their other ends by the rivet or bolt 16. The locking rod 15 is provided with a tapered key 17 inserted in a key way therein and adapted to be drawn tight thereby
20 thus securing my apparatus to the elbow twyer pipe or the reduced portion of the elbow twyer pipe, while at the same time affording a ready means of detaching the same therefrom. This particular form of
25 fastening secures the parts together by pressure applied centrally of the joint bearing surfaces whereby equal pressure is exerted on all parts of the joint, thereby keeping it true and tight with only one simple fasten-
30 ing means consisting of the key 17. This makes a tight true joint which is easily opened or closed. At the outer end of the body casting 9 is formed the extending flange 18 which is provided with a smooth
35 exterior face ground or planed to contact with a similar surface on the opposing face of the pivoted disk or shutter 19 which is mounted thereon.

40 The pivoted disk 19 is provided with a curved slot 20 therein and is pivotally attached to the flange 18 by means of the pivot bolt 21. The disk 19 is further secured in sliding contact with the flange 18 by means of the clamp bolt 37.

45 The pivot bolt 21 is provided with a dowel pin 24 secured therein as indicated in Figs. 2, 3, and 4. A slot or key-way is formed in the bolt opening of the pivoted disk 19 as indicated at 25 and a similar key-way 26 is
50 formed on the opposite side of the corresponding bolt opening in the disk or flange 18. This construction of the pivot-bolt 21 with dowel pin 24 and its opposite key-ways 25 and 26 in the bolt holes of the two por-
55 tions which it connects, is made for the purpose of maintaining the pivot bolt 21 in an upright position so that the key therefor will always be approximately vertical and thereby be accessible and prevented from
60 dropping out of the key-way, which would not be the case if the bolt should turn. To introduce the bolt 21 into the holes provided for it in the disk 19 and the flange 18 it is entered into the hole in the disk 19 when the
65 dowel pin 24 is turned down on its lower

side, the bolt thereby passing through the slot or key-way 25. When this is done the disk 19 is turned about 180 degrees whereby the dowel pin 24 registers with the slot or key-way 26 in the flange 18. The bolt can
70 therefore be pushed into its final position and when the clamp bolt 37 is in place the pivot-bolt 21 is locked in position as the dowel pin 24 is then opposite a solid part of the disk 19 thus preventing its withdrawal.
75 After the bolt 21 is in place the helical spring 28 is slipped over the bolt, the key 29 driven into the slot 27 and the key further secured by means of an open ring or cotter pin passing through the hole in its smaller
80 end, indicated in Fig. 1. The bolt 37 is provided with a similar dowel pin 24 which fits within a similar slot or key-way 26 in the flange 18, and it is also held in such position that the key is upright. The clamp
85 bolt 37 is also provided with a similar helical spring 28, a slot 27 and a tapered key 29. By reason of the above described manner of connecting the swinging disk 19 to the flanged face 18, these two parts are always
90 kept in constant tight contact as the springs 28 exert an appreciable and substantially constant pressure to hold the parts together thus preventing leakage, while, at the same time, permitting the disk 19 to be swung as
95 desired for the purpose of opening or closing the twyer-sight.

The eye-piece or peep-sight is indicated at 30 and consists essentially of a piece of metal having a double bevel or dove-tail
100 formed on its lower side which is also slightly tapered longitudinally as shown. The shorter side of the eye-piece 30 is indicated at 38 while the longer side is indicated at 39, the other sides being dove-
105 tailed and tapered and fitting in a corresponding tapered dove-tail 31 formed in the swinging disk or shutter 19. The eye-sight 30 is so arranged that it can only be placed in, or withdrawn from, its position when
110 the swinging disk 19 is in its upper location, as in that case there is no obstruction to the removal or introduction of said eye-piece. When, however, the swinging disk 19 is in its lowered position and when my
115 twyer sight is in use the eye-piece cannot be removed for the reason that it is then opposite the head of the clamp-bolt 37. This is a particular feature of my invention, the object being to prevent the removal of the eye-piece for any purpose whatsoever
120 when the hole therein registers with that in the twyer pipe. This construction therefore prevents any accidents due to the escape of hot air, dust, or other materials, should the
125 glass be cracked or dirty and an attempt be made to remove the eye-piece for the purpose of cleaning or replacing the glass when the holes in the two disks are in registry, as the opening into the twyer is closed by the
130

disk 19 before the eye-piece 30 can be removed therefrom. The eye-piece 30 is provided with a peep-hole 32 of slightly less diameter than the other hole 36 with which it registers, thereby forming an offset in which is mounted a glass 33 which may be clear and colorless or colored as desired. The glass 33 is held within the eye-piece by means of iron cement or other suitable material as indicated at 34, an undercut recess being formed for this purpose as shown, so as to retain the cement and thereby the glass in position. The eye-piece 30 is provided with a soft metal ring 35 which is preferably of copper and secured by expanding the same into an annular under-cut recess in the eye-piece as shown. The thickness of the copper collar is such that it projects slightly from the general lower surface of the eye-piece and is ground or finished smooth so as to form a tight joint against the opposing surface of the disk 19. The swinging disk 19 is provided with a thickened offset 22, in which is a tapered hole as shown to receive the end of the removable handle 23. This handle is made removable and of a particular size and taper and is given in charge of the operator whose duty it is to examine the furnace through the twyer-sight. This is done for the purpose of preventing unauthorized persons from interfering with the twyer-sight thereby conducing to general safety.

The operation of my invention is as follows:—The various parts being assembled in the positions shown in Figs. 1, 2 and 3 the eye-piece 30 and the peep-hole 32 therethrough are closed as they are opposite a solid part of the body portion 9. The handle 23 is then inserted into the tapered hole of the boss 22, and the swinging disk 19 is then turned down thereby around the pivot-bolt 21, the extent of the said movement being limited by the length of the curved slot 20. The peep-hole 32, in which is mounted the glass 33, is now in line with the hole 36, and substantially on the axial line of the blow-pipe 2 and the twyer 4, thereby permitting a view into the furnace hearth 6. After this is done the disk 19 is swung upward again whereby the hole 36 is closed by the portion of said disk 19, and the eye-piece 30 and its contained glass 33 are brought away from the heat of the furnace and the pressure of the blast, thereby maintaining the eye-piece in good condition. If, for any reason, it is desired to open up the twyer or have access to the interior of the furnace, the blast is shut off, the key 17 withdrawn, when my entire apparatus may be swung out of the way on the hinge bolt 13, thereby providing a clear opening through the pipe 8.

Another particular feature of my invention resides in the fact that the operating

handle 23 is at a considerable distance from, and out of line with, the hole 36 whereby the operator is fully protected in case the glass 33 might be cracked or broken, as he is therefore out of the line of issuing blast or dust. I prefer to make the glass 33 of substantially square or rectangular form as such shapes are more easily obtained and the recess in the eye-piece is formed correspondingly to receive said glass.

Although I have shown and described my invention in a certain and particular manner, I do not wish to be limited to the exact and specific details shown and described, but may use such substitutions, modifications or equivalents thereof as are embraced within the scope of my invention or as pointed out in the claims.

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

1. A twyer sight comprising a body-portion secured to the twyer pipe and provided with an exterior joint-face and a hole extending therethrough, a perforated disk pivotally mounted on and fitted to said joint-face, said disk being provided with a curved slot therethrough concentric with the pivot thereof, a bolt secured to the body-portion and passing through the curved slot aforesaid, thereby limiting the swinging movement of said disk, and means for swinging said disk whereby the perforation therein may be made to register or not, as desired, with the hole aforesaid.

2. A twyer sight comprising a body-portion secured to the twyer pipe and provided with an exterior joint-face and a hole extending therethrough, a perforated disk pivotally mounted on and fitted to said joint-face, a depression in the exterior surface of said disk and a removable handle fitting therein, whereby the perforation in the disk aforesaid may be made to register or not, as desired, with the hole in the body-portion, said disk being provided with a curved slot therethrough concentric with the pivot thereof, and a bolt secured to the body-portion passing through the curved slot aforesaid, thereby limiting the swinging movement of said disk.

3. A twyer sight comprising a body-portion removably secured to the twyer pipe and provided with an exterior joint-face and a hole extending therethrough, a perforated disk fitted to said joint-face, pivotally mounted thereon and clamped thereto by means of a pivot bolt and a clamp bolt provided with elastic fastening means, whereby the joint between said joint-face and said perforated disk may be maintained tight, while said disk is swung to or fro in order that the perforation therein may be made to register, or not, as desired, with the hole in the body-portion.

4. In a twyer sight, a body-portion of tubular form provided with an exterior joint-face, a perforated disk fitted to said joint-face and pivotally mounted thereon by means of a pivot bolt provided with a clamping key and an interposed spring, whereby the joint between said disk and joint-face is maintained tight while said disk is moved backward or forward, as desired, in order that the perforation therein may be opened by registering with the hole aforesaid, or closed when adjoining the solid part of the body-portion.

5. In a twyer sight of the character described, the combination with a pivoted, perforated disk, of an eye-piece slidably mounted therein, and an abutment in line with the withdrawal direction of and opposite the eye-piece when said perforation is open, thereby preventing the removal of said eye-piece when in such position.

6. In a twyer sight of the character described, a pivoted disk provided with an eye-piece slidably mounted over a perforation therein, and a stationary abutment in line with the withdrawal direction of and so located as to be opposed to said eye-piece when the perforation is connected with the sight hole, thereby preventing the removal of the said eye-piece when in such a position.

7. In a twyer sight of the character described, a sight hole therethrough, a pivoted perforated disk mounted thereon, an eye-piece slidably mounted on said disk, a stationary abutment in line with the withdrawal direction of and opposed to said eye-piece when the perforation therein registers with the hole aforesaid, said eye-piece being free from said abutment when the perforation is closed.

8. In a twyer sight of the character described, the combination with a pivoted perforated disk provided with a tapered dovetailed groove, of an eye-piece slidably mounted in said groove and provided with a soft metal ring forming a tight joint between said eye-piece and said disk.

9. In a twyer sight of the character described, the combination with a pivoted perforated disk provided with a tapered dovetailed groove, of an eye-piece slidably mounted in said groove and provided with a soft

metal ring seated in an annular undercut offset formed in and surrounding the perforation in said eye-piece and extending beyond the same and in contact with the perforated disk, whereby a tight joint is maintained between the said eye-piece and the said disk.

10. In a twyer sight of the character described, the combination with a pivoted perforated disk, of an eye-piece slidably mounted therein and provided with a glass, and an abutment in line with the withdrawal direction of and opposite said eye-piece when its opening registers with that of the twyer sight.

11. A twyer sight comprising a tubular body-portion pivotally mounted on the twyer pipe and provided with an exterior joint-face, a perforated disk fitted to said joint-face, pivotally mounted thereon and clamped thereto by means of a pivot bolt and a clamp bolt provided with elastic fastening means, an eye-piece slidably mounted on said disk and provided with a glass over the perforation therein, and means for swinging said disk, whereby said eye-piece may be made to register, or not, as desired, with the hole in the tubular body-portion.

12. The combination with a twyer pipe of a twyer sight comprising a tubular body-portion provided with an exterior joint-face and a perforated disk pivotally mounted on and fitted to said joint face, a hinge-lug on said twyer pipe, a pair of openings through said body-portion adjacent to the axis thereof, a pair of flat L-shaped latch rods pivotally secured to said hinge-lug, said latch rods passing through said openings in said body-portion, a locking-rod pivoted to the other end of the pair of latch rods and secured to said twyer pipe by means of a key or other fastening, whereby said twyer sight may be quickly connected with said twyer pipe, or quickly swung away from the same so that the latter has a free opening for other purposes.

In testimony whereof I hereto affix my signature in the presence of two witnesses.

JOHNSON V. SYMONS.

Witnesses:

ELMER SEAVEY,
ROBERT A. BEERS.