No. 802,176. PATENTED OCT. 17, 1905.

S. B. SHELDON & A. K. HAMILTON.

BLAST FURNACE.

APPLICATION FILED OCT. 5, 1904.

2 SHEETS-SHEET 1.

FIG. 7

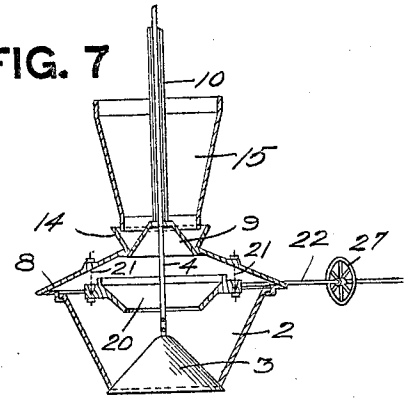


FIG. 1

WITNESSES.

J. R. Keller

Robert C. Totten

INVENTORS.

Alexander K. Hamilton

Samuel B. Sheldon

By Ray Totten & Whittemore

Attorneys

No. 802,176. PATENTED OCT. 17, 1905.

S. B. SHELDON & A. K. HAMILTON.

BLAST FURNACE.

APPLICATION FILED OCT. 5, 1904.

2 SHEETS—SHEET 2.

FIG. 2

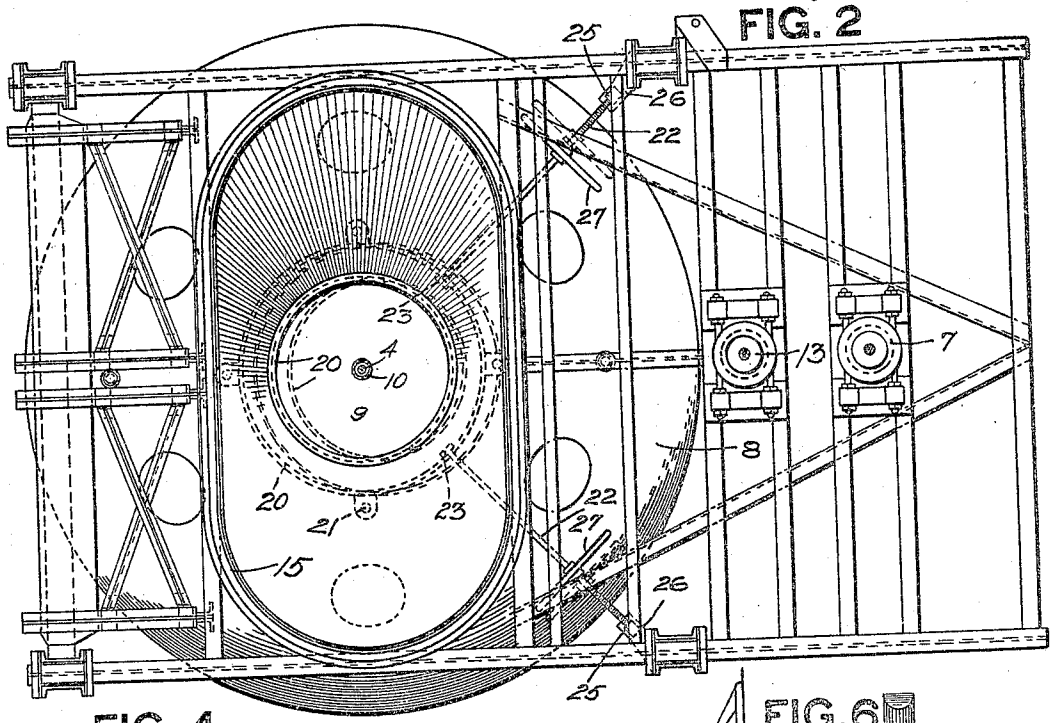


FIG. 4

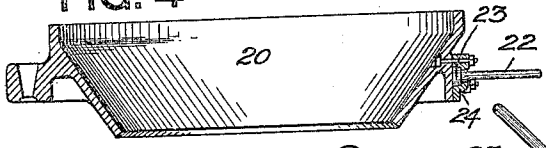


FIG. 6

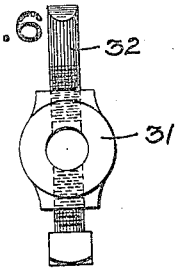


FIG. 3

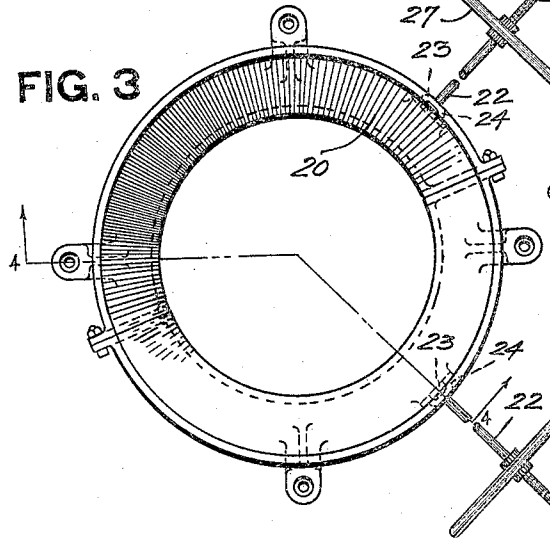
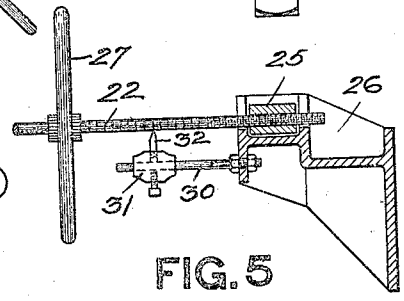


FIG. 5



WITNESSES.

J. R. Keller

Robert C Zolten

INVENTORS.

Alexander K Hamilton

& Samuel B Sheldon

By Kay Zolten & Winter

attorneys

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON D. C.

UNITED STATES PATENT OFFICE.

SAMUEL B. SHELDON AND ALEXANDER K. HAMILTON, OF BUFFALO, NEW YORK.

BLAST-FURNACE.

No. 802,176. Specification of Letters Patent. Patented Oct. 17, 1905.

Application filed October 5, 1904. Serial No. 227,283.

To all whom it may concern:

Be it known that we, SAMUEL B. SHELDON and ALEXANDER K. HAMILTON, residents of Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Blast-Furnaces; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates to blast-furnaces, and more especially to the feeding devices therefor.

Our object is to provide means whereby a uniform or other advantageous stock-line in the furnace can be secured and maintained.

In the operation of blast-furnaces the stock is fed into the furnace through an opening in the top thereof which is controlled by a bell or bells. The bell acts as a seal and as a deflector for the material and throws it out toward the sides of the stack. Unless the stock is distributed correctly in the bell-hopper more of it will be continuously deposited on one side of the furnace-chamber than on the other, thus producing a permanently uneven stock-line. The unadvantageous distribution of the stock in the bell-hopper is especially marked in furnaces charged by means of a skip, which is now almost the universal practice. Many difficulties in the operation of the furnace are due to a bad distribution of the stock.

Our invention is intended to secure an advantageous or uniform stock-line in the furnace

To this end it consists, generally stated, in providing a deflector between the hopper which receives the stock from the skip and the hopper in which the bell is situated, which deflector will divert the course of a portion of the stock in its passage from the receiving-hopper to the bell-hopper, said deflector being adjustable, so that the distribution of the stock around the bell can be regulated. As a consequence, if the furnace is working high on one side more of the material can be deflected toward the opposite side in order to even up the stock-line.

The invention also consists in other features of invention, such as a deflector in the form of an annular ring converging toward its bottom and also the specific means for adjusting said deflector-ring, such as adjusting-screws arranged substantially at right angles, so that the deflector can be moved to any desired position with reference to the receiving and bell hoppers.

In the accompanying drawings, Figure 1 is a vertical section through a furnace-top, showing our invention applied thereto. Fig. 2 is a section on the line 2 2, Fig. 1. Fig. 3 is a plan view of the deflector and its adjusting means. Fig. 4 is a vertical section on the line 4 4, Fig. 3. Fig. 5 shows details of the adjusting means. Fig. 6 is a detail view of the indicator, and Fig. 7 is a sectional view showing a modification.

Our invention can be applied to any form of blast-furnace, the drawings showing the same applied to a modern skip-charged furnace.

The top of the furnace is indicated at 1, and this is provided with an opening in which is set the lower or large bell-hopper 2.

3 is the lower bell connected to a rod 4, which will be connected to any suitable mechanism for opening and closing the bell, the drawings showing the rod 4 connected to a walking-beam 5, provided with a counterweight 6 for closing the bell and having connected thereto the piston-rod of a power-cylinder 7 for opening the same.

The hopper 2 is inclosed by means of a cover 8, as in the usual practice, this cover having at its apex an opening in which is placed the upper or small bell 9, which is connected to a tube 10, surrounding the rod 4 and havng connected to its upper end suitable means for opening and closing this bell, this means being substantially the same as that for opening and closing the lower bell—viz., a beam 11, counterweight 12, and power-cylinder 13. The upper bell works in a hopper 14, which receives the stock from the receiving-hopper 15, into which the stock is dumped by a skip 16 or other means known to furnacemen.

The furnace-top so far described is of a type in wide use and the operation is also well understood, the stock being dumped by the skip 16, barrow, or other means into the receiving-hopper 15, whence it passes down into the hopper 14. At the proper time the small bell 9 is lowered, thus discharging the stock into the hopper 2 and onto the bell 3. The upper bell 9 will then be closed and the lower bell 3 opened, thus admitting the charge into the furnace-chamber. With all

furnaces, and especially those which are skip-charged, the stock will not be evenly distributed around the bell 9, this being due to the fact that it is poured into the receiving-hopper 16 on one side or the other. This unevenness of distribution follows all the way down into the furnace-chamber, thus giving a permanently uneven stock-line in one or more places with all of its attendant disadvantages. Our invention is applied at this point and for the purpose of correcting the difficulty just named.

Between the receiving-hopper 15 and bell-hopper 2 and preferably above the bell-hopper 14 we place a deflector which can be adjusted and which will serve to divert the stock, so as to distribute it around the bell in an even or any desired manner. The deflector is shown at 20 and is preferably ring-shaped, having sloping walls converging downwardly. The upper end of this deflector is larger than the discharge-opening of the receiving-hopper 15 and the lower end is preferably somewhat smaller than the same. This deflector will be supported so that it can be moved to any position in a horizontal plane. To this end it is suspended flexibly from above, as by means of chains 21, which will permit said hopper to swing to any position horizontally. As a means for adjusting its position various devices may be employed. We have shown for this purpose an adjusting-rod 22, having a circular head 23 working loosely in a cup 24, secured to the deflector and having its opposite end threaded and working in a nut 25, held against longitudinal movement in any suitable way, such as in a suitable seat formed in a bracket 26. Either the nut or rod may be rotatable, so as to cause said rod to move toward and from the axis of the deflector. For convenience the rod is made rotatable, having secured thereto a hand-wheel 27 for turning the same.

If only a single adjusting-rod 22 were used, the deflector could be set only in different positions in a straight line across the bell-hopper. It is desirable, however, that it should be adjusted in any position in a horizontal plane. To secure this result, we use two adjusted rods 22, placed substantially at right angles to each other, as shown in Fig. 2, so that by adjusting both of these rods the deflector can be set in any position whatsoever with reference to the receiving and bell hoppers. The nuts 25 are somewhat smaller than the seats in the brackets 26 in which they rest, sufficiently so that they will have the required lateral movement to accommodate themselves to any changes in the angles of the rods 22 due to the adjustment of the latter.

An indicator will also be provided to show the state of adjustment of the screw-rods 22, so that the amount of movement given to the bell may be known. Various indicators may be employed, and we have shown for this purpose a stud 30, extending substantially parallel to the screw-rod, it being shown projecting out from the bracket 26. On this stud is adjustably secured a sleeve 31, carrying a pointer 32, projecting toward the screw-rod and in close proximity thereto. Suitable marks or graduations will be made on that portion of the screw-rod which is opposite the pointer, so that thereby the extent of adjustment of the rod can be easily read.

The deflector can be so set with reference to the receiving-hopper as to divert the course of the charge sufficiently to properly distribute it around the bell 9, and as a consequence it will be properly distributed in the furnace-chamber. Should, however, from any cause the distribution not be uniform or advantageous and the stock-line become higher on one side than on the other, it will only be necessary to adjust the deflector 20 to such a position as to divert more of the stock to the opposite or low side of the furnace. In this manner the stock-line can be evened up, and as soon as sufficiently evened up the deflector can be moved back to such a position as to continue the advantageous distribution of the stock. The advantages of this will be readily understood by those familiar with the art.

The exact arrangement and construction of parts described need not be employed, as they may be varied within wide limits without departing from the spirit of our invention. Instead of locating the deflector 20 between the receiving-hopper 15 and bell-hopper 14 it may be located between the latter and the lower bell-hopper 2, this arrangement being indicated in Fig. 7. By the term "bell-hopper" in the claims we mean the lower bell-hopper 2 unless otherwise specified. In both arrangements shown the deflector is between the receiving-hopper 15 and the lower bell-hopper 2.

What we claim is—

1. In a blast-furnace, the combination with a receiving-hopper, of a bell and its hopper, a deflector arranged between the receiving-hopper and bell-hopper, and means for adjusting said deflector horizontally.

2. In a blast-furnace, the combination with a receiving-hopper, of a bell and its hopper, a deflector arranged between the receiving-hopper and bell-hopper, and means for adjusting said deflector in all directions horizontally.

3. In a blast-furnace, the combination with a receiving-hopper, of a bell and its hopper, an annular deflector converging toward its bottom and arranged between the receiving-hopper and bell-hopper, and means for adjusting said deflector in all directions horizontally.

4. In a blast-furnace, the combination

with a receiving-hopper, of a bell and its hopper, an annular deflector having converging walls arranged between the receiving-hopper and bell-hopper, flexible supporting means therefor, and means for adjusting the deflector horizontally.

5. In a blast-furnace, the combination with a receiving-hopper, of a bell and its hopper, a circular deflector converging toward its lower end and arranged between the receiving-hopper and bell-hopper, and two adjusting means arranged at an angle to each other and serving to adjust the deflector to any position horizontally.

6. In a blast-furnace, the combination with a receiving-hopper, of a bell and its hopper, a circular deflector arranged between the receiving-hopper and bell-hopper, a pair of adjusting members connected thereto and arranged substantially at right angles to each other, and means for lengthening and shortening said adjusting members.

7. In a blast-furnace, the combination with a receiving-hopper, of a bell and its hopper, a circular deflector arranged between the receiving-hopper and bell-hopper, flexible supporting means therefor, a pair of adjusting-rods connected thereto and arranged substantially at right angles to each other, and independent means for varying the lengths of said adjusting-rods.

8. In a blast-furnace, the combination with a receiving-hopper, of a bell and its hopper, an annular deflector converging toward its lower end and arranged between the receiving-hopper and bell-hopper, flexible means on which said deflector is supported, two adjusting-rods arranged substantially at right angles to each other and connected to said deflector, and independent means for varying the lengths of said adjusting-rods.

9. In a blast-furnace, the combination with a receiving-hopper, of a bell and its hopper, a circular deflector arranged between the receiving-hopper and bell-hopper, a pair of screw-rods connected to said deflector and arranged substantially at right angles to each other, nuts engaging said screw-rods and held against longitudinal movement thereof, and means for rotating said rods and nuts relatively to each other.

10. In a blast-furnace, the combination with a receiving-hopper, of a bell and its hopper, a circular deflector arranged between the receiving-hopper and bell-hopper, flexible supporting means therefor, a pair of screw-rods arranged substantially at right angles to each other and connected to said deflector, nuts engaging said screw-rods and held against longitudinal movement thereof, and means for rotating said rods.

11. In a blast-furnace, the combination with a receiving-hopper, of an upper and a lower bell each provided with a hopper, a circular deflector between the receiving-hopper and upper bell-hopper, and means for adjusting said deflector in all directions horizontally.

12. In a blast-furnace, the combination with a receiving-hopper, of a bell and its hopper, a circular deflector arranged between the receiving-hopper and bell-hopper, a pair of adjusting members arranged at an angle to each other and connected to said deflector, means for lengthening and shortening said adjusting members, and indicating means to show the extent of such lengthening and shortening.

13. In a blast-furnace, the combination with a receiving-hopper, of a bell and its hopper, a circular deflector arranged between the receiving-hopper and bell-hopper, flexible supporting means therefor, a pair of adjusting-rods connected to said deflector and arranged at an angle to one another, means for shortening and lengthening said adjusting-rods, and indicating means to show the extent of such lengthening and shortening.

14. In a blast-furnace, the combination with a receiving-hopper, of a bell and its hopper, a circular deflector arranged between the receiving-hopper and bell-hopper, screw-rods connected to said deflector and arranged at an angle to one another, nuts engaging said screw-rods, means for rotating said rods and nuts relatively to one another, graduations on said screw-rods, and a stationary pointer arranged in proximity to said graduations.

In testimony whereof we, the said SAMUEL B. SHELDON and ALEXANDER K. HAMILTON, have hereunto set our hands.

SAMUEL B. SHELDON.
ALEX. K. HAMILTON.

Witnesses:
R. R. HILLMAN,
A. C. BYAM.