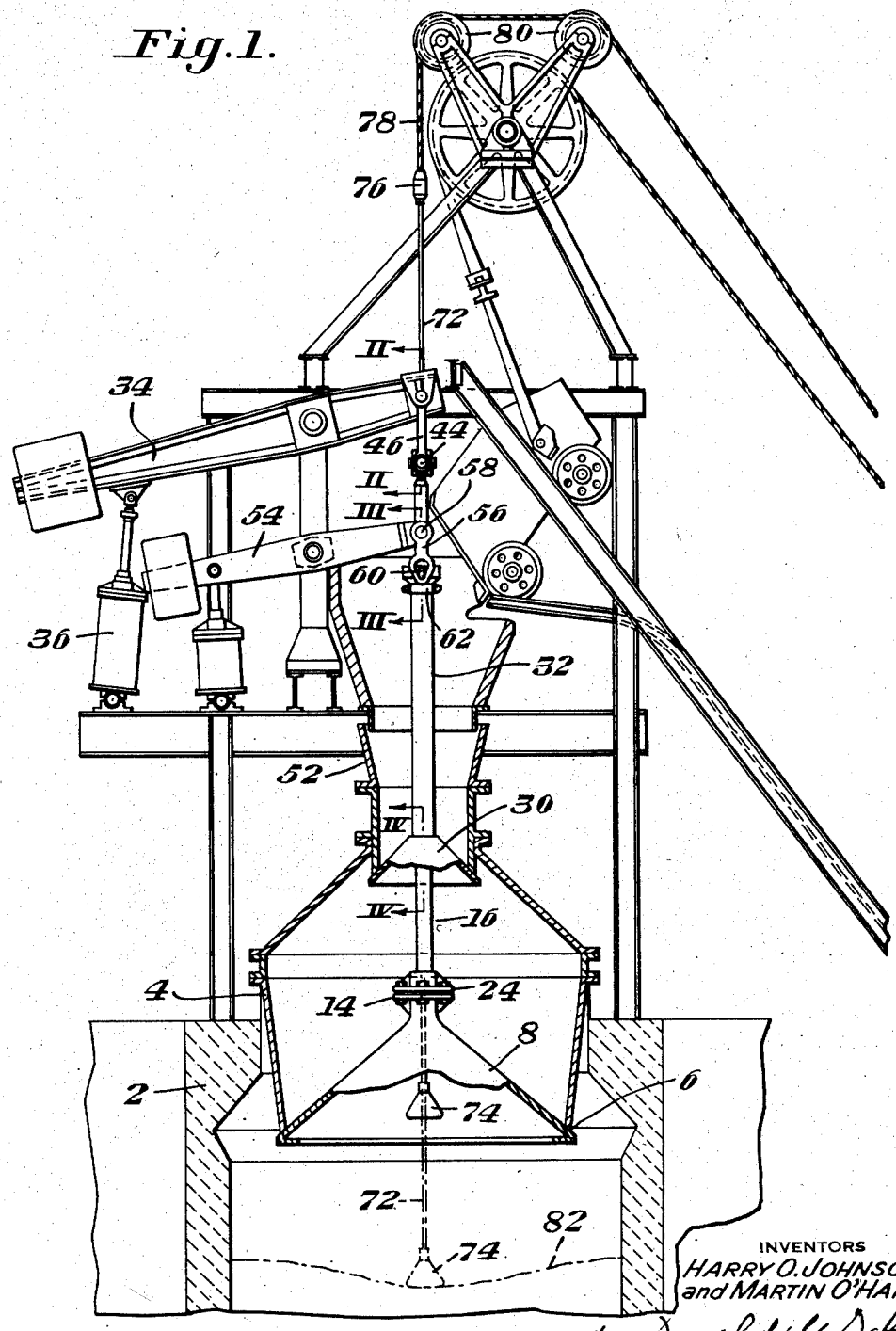
Aug. 7, 1951 H. O. JOHNSON ET AL 2,563,681

LARGE BELL ASSEMBLY

Filed March 1, 1946 2 Sheets-Sheet 1

Fig. 1.



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LARGE BELL ASSEMBLY

Filed March 1, 1946 2 Sheets-Sheet 2

Fig. 2.

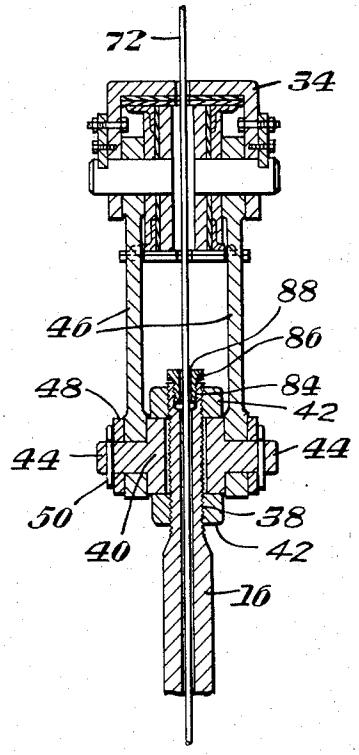


Fig. 4.

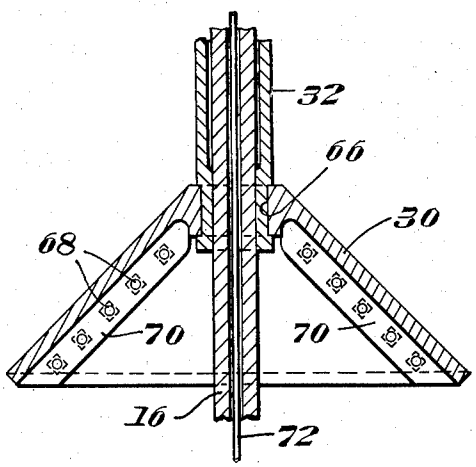


Fig. 5.

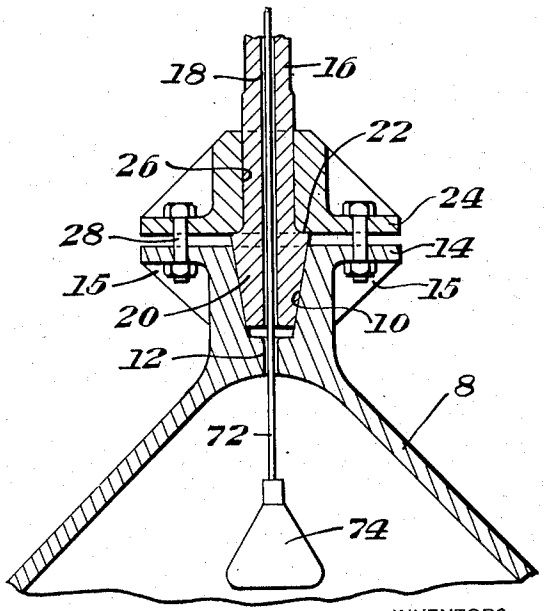
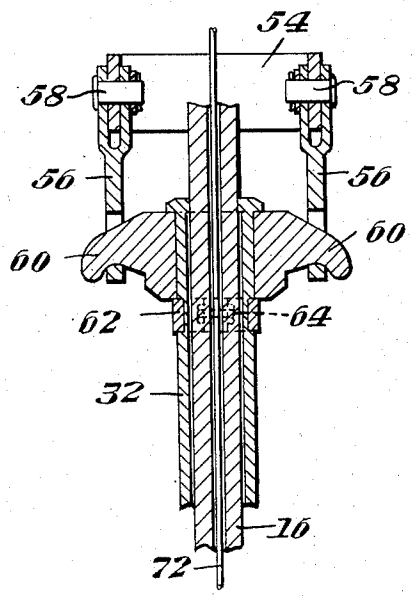


Fig. 3.



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Patented Aug. 7, 1951

2,563,681

UNITED STATES PATENT OFFICE

2,563,681

LARGE BELL ASSEMBLY

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Application March 1, 1946, Serial No. 651,109

7 Claims. (Cl. 214—36)

1

This invention relates to a large bell assembly for a blast furnace. As is well known, the assembly of the large and small charging bells at the top of the blast furnace is relatively complicated because the two bells have a common axis. Various means have been used in fastening the large bell to its bell rod, but they are costly, complex and lack rigidity. The assembly is further complicated by the necessity of providing a gage rod that will accurately register the level of the stock in the blast furnace. Normally two gage rods which are located off center are used, but because of their location they register high and low spots of the stock depending upon the position of dumping from the distributing hopper.

It is an object of our invention to provide a large bell assembly in which the bell is rigidly fastened to the bell rod in a simple manner which permits a gage rod to be located centrally of the furnace.

This and other objects will be more apparent after referring to the following specification and attached drawings, in which:

Figure 1 is an elevation, partly in cross section, of the bell assembly;

Figure 2 is an enlarged sectional view taken on the line II—II of Figure 1;

Figure 3 is an enlarged sectional view taken on the line III—III of Figure 1;

Figure 4 is an enlarged sectional view taken on the line IV—IV of Figure 1; and

Figure 5 is an enlarged detail of the connection between the bell rod and large bell.

Referring more particularly to the drawings, the reference numeral 2 indicates the top wall of a blast furnace. Mounted on top of the blast furnace in the usual manner is the large bell hopper 4 which is open at the bottom end to provide a seat 6 for the large bell 8. As best shown in Figure 5, the top of the large bell is bored out to provide a central opening 10 which tapers downwardly toward the center of the bell. A small hole 12 extends from this opening into the bell for a purpose which will appear later. The bell 8 has an integral flange 14 which surrounds the opening 10 at the top thereof and is reinforced by equally spaced webs 15. A bell rod 16 having an axial opening 18 therethrough is enlarged at its tapered lower end 20 which is received in the tapered opening 10. Between the main portion of the rod and the enlarged portion 20 is a shoulder 22. Located above the flange 14 is a flange 24 having an opening 26 therethrough of approximately the same diameter as the rod 16. The two flanges are fastened

2

together by means of bolts 28 which force the tapered end 20 of the rod 16 into the tapered bore 10 of the large bell as they are tightened. The large bell rod 16 extends upwardly through the small bell 30 and the small bell rod 32 to the large bell operating beam 34 which is connected at its outer end to the hydraulic motor 36. As shown in Figure 2, the upper part of the large bell rod 16 has a reduced threaded portion 38 which passes through the crosshead 40 of the beam 34 and is fastened thereto by means of nuts 42 on each side thereof.

The cross head 40 has a projecting trunnion 44 on each side thereof to which is attached a link 46. The links 46 are allowed to swing radially on the trunnions and are held in horizontal position by washers 48 and pins 50. The links 46 transmit the up and down movement from the large bell beam 34 to the large bell rod 16, thus opening and closing the large bell 8. By means of this upper connection, it is possible to adjust the length of the bell rod 16 in order to properly seat the large bell.

The straight threaded end 38 makes it possible to use a one-piece tubular small bell rod 32 instead of the split two-piece rod which is normally used. The small bell rod 32 passes through the small bell hopper 52 and is connected to the small bell operating beam 54 by means of links 56 which are connected by pins 58 to the beam. The links 56 supports a trunnion 60 which is held to the small bell rod 32 by means of a split collar 62 fastened together by bolts 64. As shown in Figure 4, the lower portion of the small bell rod 32 is provided with a recess 66 for receiving the split small bell 30, the sections of which are held together in the recess 66 by bolts 68 passing through flanges 70 on the various bell sections.

A special steel center cable 72 passes through the hole 18 in the large bell rod and the hole 12 in the large bell 8. A weight 74 is attached to its lower end and its upper end is attached by means of connector 76 to a standard flexible cable 78 which passes over sheaves 80 and thence down to a standard hoisting drum (not shown). The weight 74 is heavy enough to pull both cables 72 and 78 taut and correctly register the level of the stock 82 when it rests thereon below the large bell 8, as shown in broken lines in Figure 1.

In order to prevent leakage of gas from the furnace the large bell rod 16 is provided with a threaded bore 84 at its upper end for receiving a packing gland 86 which has an opening 88 therethrough to permit passage of the cable 72.

While one embodiment of our invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

We claim:

1. A large bell assembly for a blast furnace comprising a large bell having a central opening in the top thereof, said opening tapering downwardly toward the center of the bell, a flange on the bell surrounding the opening, a rod, a tapered portion at the bottom end of said rod which is received in said opening, the top of said tapered portion being of greater diameter than the rod adjacent thereto to provide a shoulder on the rod at the top of the tapered end, a top flange having an opening therein surrounding the main portion of the rod and resting on said shoulder, and means for fastening the flanges together and tightening the top flange against the shoulder to force the tapered end of the rod into the tapered opening.

2. A large bell assembly for a blast furnace comprising a large bell having a central opening in the top thereof, said opening tapering downwardly toward the center of the bell, a flange on the bell surrounding the opening, a rod, a tapered portion at the bottom end of said rod which is received in said opening, the top of said tapered portion being of greater diameter than the rod adjacent thereto to provide a shoulder on the rod at the top of the tapered end, a top flange having an opening therein surrounding the main portion of the rod and resting on said shoulder, means for fastening the flanges together and tightening the top flange against the shoulder to force the tapered end of the rod into the tapered opening, a reduced threaded portion at the top of the rod, an operating beam crosshead surrounding said threaded portion, and a nut threaded on said threaded portion on each side of the crosshead.

3. A bell assembly for a blast furnace comprising a large bell having a central opening in the top thereof, said opening tapering downwardly toward the center of the bell, a flange on the bell surrounding the opening, a rod having a tapered portion at the bottom end thereof which is received in said opening, the top of said tapered portion being of greater diameter than the rod adjacent thereto to provide a shoulder on the rod at the top of the enlarged end, a top flange having an opening therein surrounding the main portion of the rod and resting on said shoulder, means for fastening the flanges together and tightening the top flange against the shoulder to force the tapered end of the rod into the bell opening, said bell and bell rod having aligned axial openings therethrough, and an elongated measuring device passing through the openings in the large bell and large bell rod for measuring the level of stock in the furnace.

4. A bell assembly for a blast furnace comprising a large bell having a central opening in the top thereof, said opening tapering downwardly toward the center of the bell, a flange on the bell surrounding the opening, a rod having a tapered portion at the bottom end thereof which is received in said opening, the top of said tapered portion being of greater diameter than the rod adjacent thereto to provide a shoulder on the rod at the top of the enlarged end, a top flange having an opening therein surrounding the main portion of the rod and resting on said shoulder, means for fastening the flanges together and tightening the top flange against the shoulder to force the tapered end of the rod into the bell opening, said bell and bell rod having aligned axial openings therethrough, a cable passing through the aligned openings, and a weight attached to the bottom of said cable for measuring the level of stock in the furnace.

5. A bell assembly for a blast furnace comprising a large bell having a central opening in the top thereof, said opening tapering downwardly toward the center of the bell, a flange on the bell surrounding the opening, a rod having a tapered portion at the bottom end thereof which is received in said opening, the top of said tapered portion being of greater diameter than the rod adjacent thereto to provide a shoulder on the rod at the top of the enlarged end, a top flange having an opening therein surrounding the main portion of the rod and resting on said shoulder, means for fastening the flanges together and tightening the top flange against the shoulder to force the tapered end of the rod into the tapered opening, a reduced threaded portion at the top of the rod, an operating beam crosshead surrounding said threaded portion, a nut threaded on said threaded portion on each side of the crosshead, said bell and bell rod having aligned axial openings therethrough, a small bell surrounding said large bell rod, a small bell rod attached to said small bell and surrounding said large bell rod intermediate the ends thereof, a cable passing through the aligned openings, and a weight attached to the bottom of said cable for measuring the level of stock in the furnace.

6. A bell assembly for a blast furnace comprising a large bell hopper having its bottom end open to provide a seat, a large bell having a greater diameter than said seat and adapted to be raised to seat on said seat, said large bell having a central opening therethrough, a large bell rod fastened to the top of the bell, said rod having an axial opening therethrough, a small bell hopper fastened to the top of the large bell hopper, said small bell hopper having its bottom end open to provide a seat, a small bell surrounding said large bell rod and seated on the last named seat, a small bell rod attached to said small bell and surrounding said large bell rod intermediate the ends thereof, and an elongated measuring device passing through the openings in the large bell and large bell rod for measuring the level of stock in the furnace.

7. A bell assembly for a blast furnace comprising a large bell hopper having its bottom end open to provide a seat, a large bell having a greater diameter than said seat and adapted to be raised to seat on said seat, said large bell having a central opening therethrough, a large bell rod fastened to the top of the bell, said rod having an axial opening therethrough, a small bell hopper fastened to the top of the large bell hopper, said small bell hopper having its bottom end open to provide a seat, a small bell surrounding said large bell rod and seated on the last named seat, a small bell rod attached to said small bell and surrounding said large bell rod intermediate the ends thereof, a cable passing through the openings in the large bell and large bell rod, and a weight attached to the bottom of said cable for measuring the level of stock in the furnace.

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MARTIN O'HARE.

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