

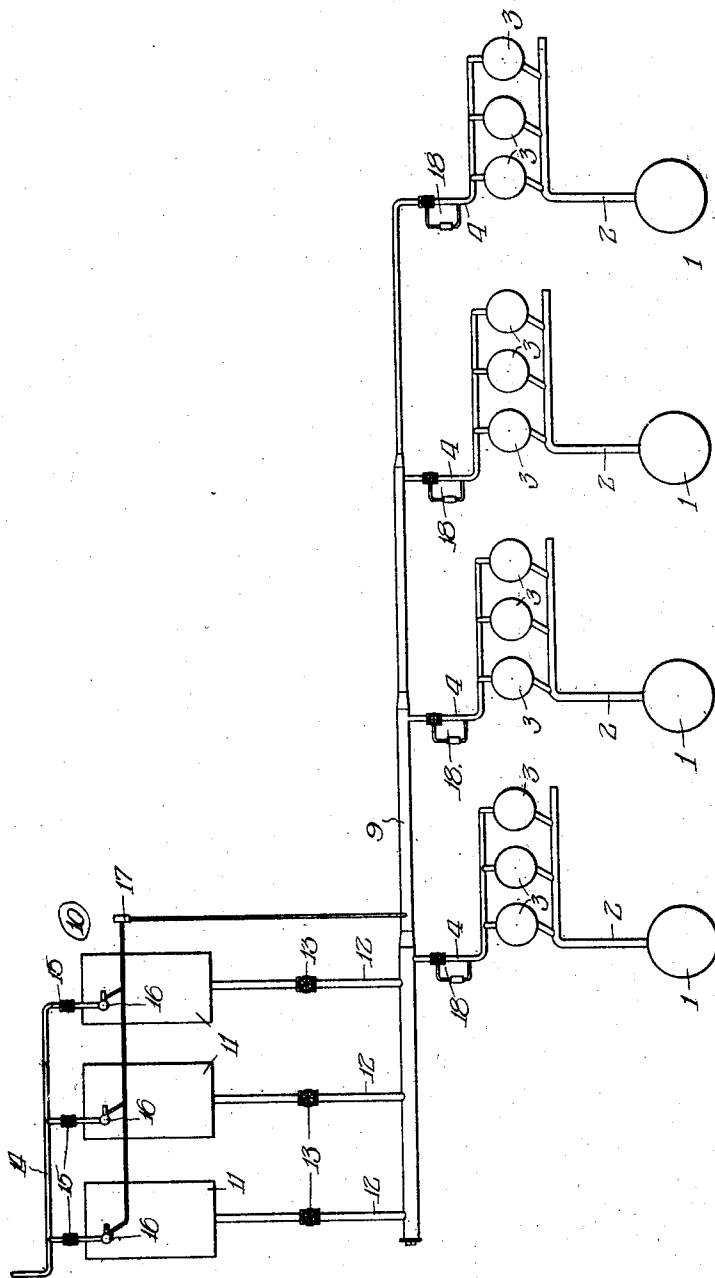
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AIR SUPPLY SYSTEM FOR BLAST FURNACES

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UNITED STATES PATENT OFFICE.

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AIR-SUPPLY SYSTEM FOR BLAST FURNACES.

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The present invention relates to air supply systems for blast furnaces.

It is essential that a blast furnace be supplied with air at as uniform a rate as possible. It is customary to exercise great care that the source of the air blast, whether reciprocating blowing engines or turbo blowers, deliver air to the furnace at a constant rate of flow. With two or more furnaces in operation, it has been common practice to have each furnace connected to its own individual blast equipment, each furnace with its blowing equipment and connecting blast piping being a separate and distinct unit. By this practice it is possible to accurately control the volume of air delivered to each furnace by controlling the speed of the blowing unit. The practice of providing separate blowing units for each furnace is expensive in view of the fact that a large number of blowers has been required, which has involved a large number of auxiliaries, such as condensers, pumps, piping, air intake tunnels, a large amount of foundation work, large buildings, and a large number of mains.

An object of the present invention is to provide an efficient system in which, in a plant employing two or more furnaces, wind is taken from a blast main common to all of said furnaces.

A further object is to provide a system employing two or more furnaces in which wind is taken from a common source and delivered to each of said furnaces in constant volume regardless of variations in the working condition of each furnace and regardless of variations in the working conditions between said furnaces.

A further object is to provide a system employing two or more blast furnaces in which each furnace is provided with a constant volume control and in which a single blast source will be controlled to suit conditions.

Further objects will appear as the description proceeds.

Referring to the drawings—

The one figure of the drawing is a view illustrating the principles of the present invention, the number of furnaces being supplied with air being the same as the layout illustrated in the figure.

The improved system disclosed in the drawing shows furnaces 1—1, each con-

nected through a corresponding pipe line 2 to its individual set of stoves 3—3, each individual set of stoves being connected to the corresponding pipe line 4. Each of the pipe lines 4 is connected to the main 9, which main is supplied by a blast supply unit indicated by the numeral 10. Said blast unit 10 may consist of one or more blowers. In the diagrammatic showing of the drawing, three blowers 11—11 are illustrated, which blowers operate in parallel, each being connected to the main 9 through a pipe 12 controlled by the manually operable valve 13.

According to the system illustrated in the drawing, the motive power for driving the blowers 11—11 is derived from the steam line 14, which is connected to the driving means for the blowers 11—11 through the manually operable valves 15—15. Connected in series relationship with each of the manually operable valves 15—15 is a control valve 16. Each of said control valves 16 is responsive to the pressure regulator 17, which pressure regulator is responsive to the pressure within the main 9.

Each of the blast lines 4—4 is provided with the volume regulator 18, which has the function of maintaining a constant volume of air to the blast furnace 1, regardless of variations in working conditions of its corresponding blast furnace and regardless of variations in working conditions between the various blast furnaces 1—1.

In the operation of the system disclosed in the drawing it will be necessary to carry the pressure in the blast main 9 at or slightly in excess of the pressure demanded by the furnace with the greatest blast resistance. The present invention contemplates a co-ordination of the pressure regulator 17 with the separate constant volume controls 18—18, whereby the blast pressure upon each furnace 1 will be built up or reduced to suit the furnace of maximum pressure demand. Operation of the pressure regulator 17 will result in operation of the control valves 16—16 to control the supply of steam to the driving means for each of the blowers 11—11 to effect the proper speed regulation of said blowers. Manual operation of the system is also possible by reason of the manually operable valves 15—15.

By the improved system illustrated in the drawing, considerable savings are effected in plant construction and operating costs.

For instance, a conventional plant of four blast furnaces requires 6 turbo blowers, any four of which may be operated, the other two being held in reserve for emergencies. The two spare blowers provide fifty per cent protection against furnace shut-down due to blast failure. The improved system disclosed in the drawing contemplates the use of a single unit comprising three blowers (which number may be reduced if desired) to operate a four-furnace plant. With three blowers, as shown in the drawing, two of the blowers would be operated and would have a combined capacity to blow all four furnaces, while one would be a spare, affording a fifty per cent protection. In case it were preferred to install the two blowers, each would have sufficient capacity to blow all of the furnaces, while the other would be a one hundred per cent spare. A very considerable saving results in the system disclosed in the drawing over the conventional system, by reason of the lesser number of blowers, the lesser number of connected auxiliaries such as condensers, pumps, piping, air intake tunnels and the like, less foundation work, smaller buildings, and the provision of one common blast main against a number of separate mains leading to the individual furnaces.

Though one embodiment of the present invention has been indicated diagrammatically, many modifications will occur to those skilled in the art. It is intended to cover

all such modifications that fall within the scope of the appended claims.

What is claimed is—

1. In a blast furnace system, a plurality of blast furnaces, conduit means for supplying air to each of said furnaces, each of said conduit means being provided with a volume regulator for controlling the rate of air supply to its corresponding furnace, a common blast main for delivering air to said regulating means, an air supply unit, and means responsive to the pressure within said blast main for controlling said air supply unit.

2. In a blast furnace system, in combination, a plurality of furnaces, individual means for supplying air to each of said furnaces, a common blast main connected to said air supply means, each of said air supply means being provided with a volume regulator, and means for regulating the pressure of air delivered to said blast main.

3. In a blast furnace system, in combination, unitary air supply means, means for maintaining constant the air pressure therein, and a plurality of furnaces supplied by said unitary air supply means, each of said furnaces having operatively associated therewith regulating means for controlling the volume of air delivered to each of said furnaces.

Signed at Chicago, Illinois, this 11 day of Febr., 1927.

ALFRED J. EBNER.