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N. MEURER
METHOD OF TREATING THE INTERNAL AND EXTERNAL SURFACES
OF ELONGATED BODIES
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Fig. 1.

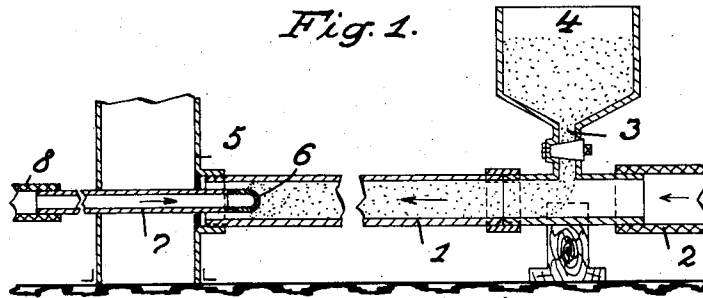


Fig. 2.

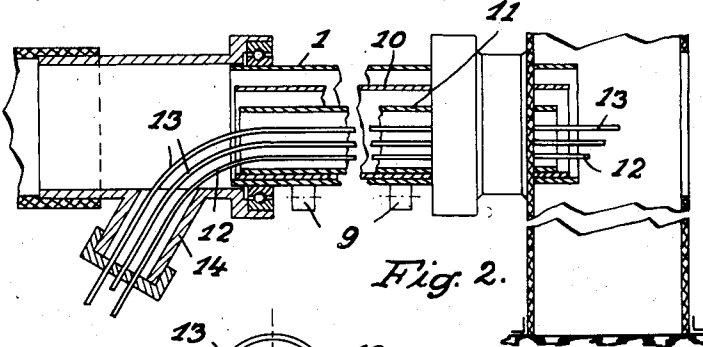


Fig. 3.

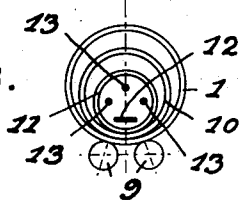


Fig. 5.

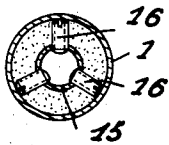
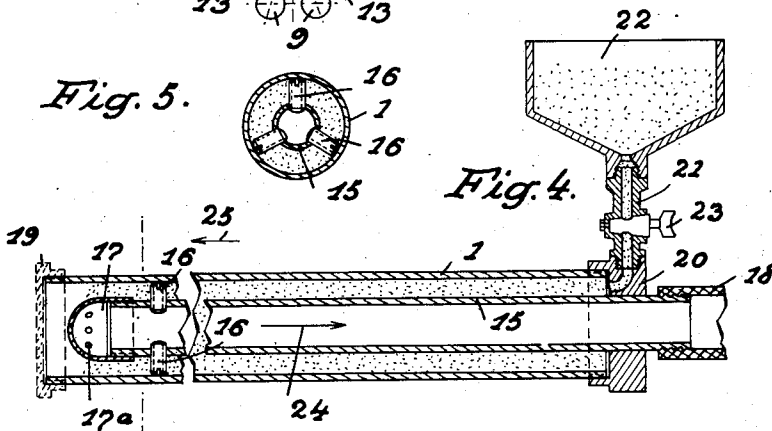


Fig. 4.



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METHOD OF TREATING THE INTERNAL AND EXTERNAL SURFACES OF ELONGATED BODIES.

Application filed June 7, 1923, Serial No. 643,984, and in Germany November 29, 1922.

This invention relates to a method of cleaning and removing the scale from more particularly elongated bodies, either straight or bent or coiled, such as pipes, coiled pipes and the like, by the action of materials, such as sand, steel balls, emery powder and the like, thrown against the walls of the bodies by gases under pressure, and to a method of providing such bodies with linings, for instance metal, concrete or the like by projecting a stream of metallic dust, concrete or the like at them also by gases under pressure.

The method is adapted more particularly for cleaning the external and internal surfaces of straight or coiled pipes by means of the sand blast, or, where a mixture of gas under pressure and fluid particles is used, for cleaning by means of substances acting in a chemically disintegrating manner.

For example, in order to clean internally pipes of many meters length by means of a sand blast according to the present invention, if the bore of the pipes to be treated is relatively small, i. e. if their internal diameter is smaller than 30 mm., a flexible tube, which is connected to a suitable sand blast apparatus of a known type and which preferably has a considerably larger internal diameter than the pipe to be treated, is connected to one end of the said pipe, the other end of the latter being open to the atmosphere or inserted into a receptacle, and a stream of compressed air with an admixture of sand particles is thereupon forced through the article to be treated, which as it were forms the nozzle of the tube of the blast apparatus. The effect of this method is so rapid, even at a pressure of one atmosphere above atmospheric, that within a few minutes the article will be completely cleaned and ready for any further treatment, for instance for galvanizing in the immersion bath or for other work or objects.

If in place of sand, acid vapours or corrosive substances in a fine, liquid state be mixed with the compressed air and this mixture be forced through the article to be treated, the latter will be cleaned by chemical means.

Similarly according to the invention the inside of a cleaned pipe can be for instance

galvanized, by a stream of preferably heated compressed air with an admixture of zinc powder or vaporized zinc being forced through the interior of the pipe. If instead of heated air, cold air be used, the same effect may be obtained, if for instance the article to be treated be heated from without. In any case the zinc gases liberated from the zinc powder or already mixed with the compressed air in gaseous form penetrate into the pores of the article, while being driven through it, and alloy themselves with the article and form a coating of zinc on it. By the use of other metals in the form of powder or vapour as admixtures of a compressed gas, for instance compressed air, coatings of lead, tin, aluminium and other metals may be applied.

In order to treat tubular articles of larger internal diameter in a similar manner, the cross-sectional area of the opening may be restricted artificially by any suitable means.

Referring to the accompanying drawings illustrating by way of example different modes for carrying the invention into effect, the pipe to be treated being shown in position,

Figures 1 and 2 are sectional elevations of two different arrangements,

Figure 3 a transverse section of Figure 2, whilst

Figures 4 and 5 illustrate in sectional elevation and cross section respectively a modified arrangement for carrying the invention into effect.

Referring to Fig. 1 of the accompanying drawing the method may be carried into effect in the following manner:

One end of the article 1 to be treated is connected by a flexible tube 2 to the compressed air supply and by the branch pipe 3 to the vessel 4 containing the material to be sprayed, for instance sand, the other end of the article to be treated resting in a bearing sleeve of the reservoir 5.

Owing to the large diameter of the article 1 to be treated the mere flowing through of the compressed air and sand mixture from 2-4 would take far too long, owing to the relatively great expansion, i. e. the reduction in pressure and velocity in the part 1, to clean the article in an economical manner.

If, however, a rod or a pipe 7 closed at the front, say by a cap or a plate 6, be introduced into the end of the part 1 communicating with the vessel 5 and the said rod or pipe be pushed forward in a central position gradually into the interior of the part 1 in the direction of the arrow, so that it gradually passes right along the pipe 1, the cross-sectional area of the pipe 1 is reduced and the mixture of compressed air and sand travels all around the head 6 at the place of impact and thus has to pass through the narrow gap between the parts 1 and 6, 7. This will not only cause the stream of compressed air and sand to assume a considerably increased velocity, but the particles of sand are deflected from their central direction towards the periphery of the pipe 1 and are forced to impinge against the inside of the walls of the pipe and to perform work. In order to prevent the pipe head 6, which is readily removable, being seriously affected by the sand particles impinging on it, it may be provided with lateral perforations or slits or with a slot shaped opening and compressed air at a greater pressure than that coming from the tube 2 at the same time forced through the pipe 7 into the interior of the pipe 1. This compressed air, which is introduced at 8 will deflect the sand particles away from the cap or plate 6 and will also assist in directing the sand particles towards the periphery of the tube 1.

The internal diameter of tubular articles may also be restricted by the insertion of rods, pipes, wires, cables, cords, metal strips and the like, which has the advantage, that besides the inside of the walls of the article surrounding the inserted pieces all the walls of the latter themselves are treated in the same manner as the surrounding article.

Figs. 2 and 3 illustrate, by way of example, how in the manner referred to the tubular surrounding article 1, which preferably rests on rollers 9 and is caused to rotate slowly, contains as insertions a number of pipes 10—11 of smaller diameter and preferably of the same length as the surrounding article 1, while the innermost insertion 11 may surround iron strips 12 or wires 13 and the like. These inserted pieces 10—11, 12—13 reduce the internal cross-sectional area of the surrounding article 1 to such an extent that only a relatively narrow passage is left for the compressed air and sand mixture, which imparts a great velocity to the said mixture.

When the surrounding piece 1 rolls on the rollers 9, the inserted pieces also roll on each other and the compressed air and sand mixture is thus enabled to act on the articles to be treated in a thoroughly uniform manner, so that, if the inserted pieces are for instance pipes, these inserted pipes are treated uniformly externally and internally by the

mixture of compressed air and particles of treating material.

The wires, strips, cables and the like, which pass through the innermost inserted pipe 11, may be led in and out laterally by special means and may be introduced into the interior of 11 in such a manner that they are fed forward in their longitudinal direction at a definite velocity through the interior of the inserted pipe and are unwound and wound up independently of the rotation of the bodies surrounding them.

Just as the articles may be cleaned in the manner just described with sand mixed with the compressed air, the articles to be treated may also be cleaned chemically, by mixing vaporous or liquid substances such as acids or corrosive liquids with the compressed air, which substances are capable of exercising a cleaning action on the surface of the articles to be treated.

It is obvious that the articles may be metallized as well as cleaned, by adding metals in the form of powder or vapour to the compressed air.

The described method for throttling a stream of compressed air carrying particles of material in the interior of the articles to be cleaned, scaled or provided with an internal coating, for instance to be metallized, can be carried out, while adhering to the principle underlying the invention, by providing in the hollow bodies to be treated a separate path, along which gases under pressure can travel, and by introducing the treating material for removing scale from, cleaning or metallizing the hollow bodies separate from the said separate path through the hollow body to be treated.

This modification of the invention, as shown in Figs. 4 and 5, is carried out as follows:

Into the hollow body 1, which is to be treated, there is inserted a member 15, which is preferably coaxial with the hollow body and consists for instance of a pipe 15 for gases under pressure (for instance compressed air) the distance between the body 1 and the pipe 15 being maintained by pins 16 fixed at intervals in the part 15, for instance by screwing. The head piece 17 of the compressed gas pipe 15, which is introduced into the article to be treated, is adapted to be readily removed and is provided with exit openings 17^a, which are directed towards the walls of the article 1 to be treated.

The space between the article 1 and the part 15 is thereupon filled with the particles of the treating material, for instance sand, emery, steel waste, metallic dust and the like. The space between the two pipes 1 and 15 is preferably filled with the treating material in the following manner: The end of the pipe 1, indicated to the left in the drawing, is provisionally closed in an air-tight manner by

means of a stopper 19. The other end of the pipe 1 is also closed by a stopper 20, which is however provided with a central opening for the compressed air pipe 15. The stopper 5 20 is connected by means of a branch pipe 21 and a tube or pipe attached thereto to a vessel 22 containing the treating material.

If a tube or hose pipe be slipped onto the end of the pipe 15 projecting through the stopper 20 and be connected to a vacuum pump, the pipe head 17 will suck the air out of the pipes 1 and 15, so that the space between the pipes 1 and 15 becomes filled with the material to be sprayed.

15 After the space between the pipes 1 and 15 has been filled in this or some other manner, all but the part surrounding the suction head 17, the cock 23 in the branch pipe 21 is closed, the stopper 19 removed from the pipe 1 and the open end of the pipe 1 allowed to communicate with a dust collecting chamber, which is not shown in the figure.

If in place of the former suction, a stream of air at high pressure be thereupon sent through 18, 15—17, 17^a into the interior of the pipe 1, which may be caused to rotate, and either the pipe 15 or the pipe 1 be moved slowly in the direction indicated by the arrows 24—25, the particles will continuously 30 fall into the stream of gas under pressure (air) issuing from the head 17 and are thrown with great force against the inside of the walls of the pipe 1, the superfluous particles, which have already performed work, being 35 blown, after a member replacing the stopper 19 has been opened, into the collecting chamber and collected there and, after separation (sifting) and removal of the useless particles, kept in readiness for further use.

40 When the treating material does not consist of sand or other cleaning or scale removing material, but of metal, for instance zinc, lead or the like dust, the interior surfaces of the walls of the article to be treated can also 45 be metallized in the manner described, it being only necessary, to pass heated air instead

of cold air through 15 or to heat the pipe 1 from the outside.

Instead of moving the pipes 1—15 in the direction of the arrows 24—25, the treating 50 material may be slowly pushed forward in the pipe 1 by the action of some pressure producing forces, for instance by means of a piston.

By the terms "treating" and "treating material" used in the claims it is to be understood that these terms cover cleaning or coating and cleaning or coating material.

What I claim is:—

1. A method of treating elongated pipes 60 open at both ends throughout their entire length which comprises injecting the treating material under pressure, and maintaining the pressure throughout the length of the pipe to be treated substantially the same. 65

2. A method of coating the interior of an elongated pipe, consisting in reducing the volume within said pipe and forcibly injecting treating material under pressure, and maintaining the pressure thereof throughout the 70 length of the pipe being treated substantially the same.

3. A method of treating elongated pipes throughout their entire length which comprises introducing the pipes in an enclosing 75 pipe, reducing the volume within said enclosing pipe and the other pipes, injecting under pressure finely divided material, and maintaining the pressure substantially the same throughout the length of the pipes whereby 80 the entire length of the pipes are treated.

4. A method as claimed in claim 3, including the additional step of rotating the enclosing pipe.

5. A method of treating elongated pipes 85 as claimed in claim 2, which includes the additional step of exercising relative movement between the pipe and the reducing means.

In testimony whereof I have signed my name to this specification.

NICOLAUS MEURER.