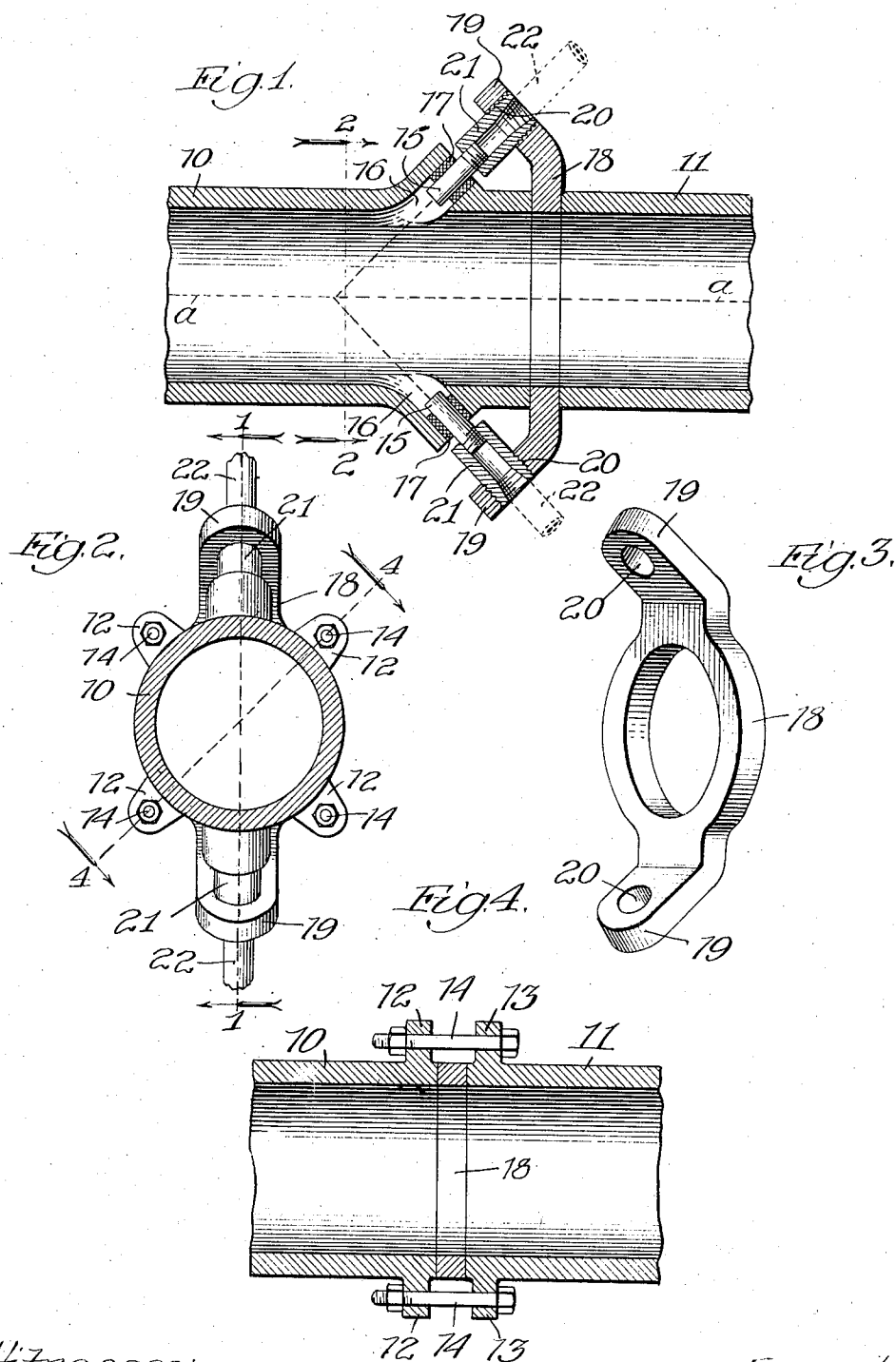


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ASH CONVEYING SYSTEM.  
APPLICATION FILED MAR. 21, 1918.

1,311,297.

Patented July 29, 1919.



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# UNITED STATES PATENT OFFICE.

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## ASH-CONVEYING SYSTEM.

1,311,297.

Specification of Letters Patent.

Patented July 29, 1919.

Application filed March 21, 1918. Serial No. 223,690.

*To all whom it may concern:*

Be it known that I, ARTHUR P. STRONG, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Ash-Conveying Systems, of which the following is a specification.

This invention relates to conveying systems for abrasive materials such as ashes and the like.

In conveying systems of such kind, the abrasive material or ash is moved through the pipe line pneumatically, the current being created by jets of steam or other fluid being discharged into the pipe line at a plurality of places in its length and in the direction of flow of the ash current there-through. It has been the practice heretofore to screw or fasten the steam jet nozzles directly into threaded holes cut in the wall of the required pipe sections for that purpose, thereby making it necessary to employ a pipe section made of a material, such as soft gray iron, capable of being machined or cut by metal cutting tools to provide the threaded holes or openings for the nozzles. In a straight run of pipe one or more sets of nozzles may be employed, with the several nozzles of each set arranged about the pipe section so as to discharge jets of steam into the pipe section at substantially the same angles to the center line of the pipe line, so that said jets will intersect at the center of the pipe line and blend and produce a resultant effort along the center line of the pipe. In such case, if the nozzles are not accurately alined or set, one jet of fluid will offset the other and cause the ash current to be distorted and blown against the inner surface of the pipe section, with the result that the same will be subjected to an increased amount of wear due to the abrasive action of the material flowing thereagainst, and, as the pipe section must be made of soft material so as to be machined for setting the nozzles, it follows that the wear on said pipe section will be rapid and detrimental thereto.

It is among the objects of my invention to provide the pipe section into which the nozzles project of hard iron or a material of such hardness that it cannot be operated upon by machining and thus prolong the life of the pipe section, in case the jets of steam or fluid at any time blow the ash cur-

rent to one side of the center line of the pipe section and against the inner wall thereof. With such a pipe section I have devised means whereby the nozzles may be accurately alined or set in such a hard iron pipe section and thus be positioned to discharge jets of steam into the pipe section at the same angles to the center line thereof, so that the jets will intersect at the center line of the pipe section and will blend and produce a resultant effort along the center of the pipe. Such nozzle supporting means is independent of said hard iron pipe section, or, as it may be expressed, other than the hard iron pipe section, and may therefore be made of a material that may be machined or operated upon by metal cutting tools for the purpose of permitting the nozzles to be secured thereto in the positions required for properly discharging into said hard iron pipe section.

The invention consists further in the matters hereinafter described and more particularly pointed out in the appended claims.

In the accompanying drawings—

Figure 1 is a vertical sectional view taken on line 1—1 of Fig. 2 and showing means constructed in accordance with my invention for supporting the nozzles in position to discharge into a pipe section made of a material of such hardness that it cannot be operated upon by machining;

Fig. 2 is a vertical sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a perspective view of the supporting member for the nozzles; and

Fig. 4 is a sectional view taken on line 4—4 of Fig. 2.

In the drawings, I have shown two pipe sections 10 and 11, forming part of the pipe line of an ash conveying or like system. The pipe section 10 is made of a material of such hardness that it cannot be operated upon by machining, such as hard iron, while the section 11 may be made of the same material or of a relatively softer material such as soft gray iron. Said pipe sections 10 and 11 are clamped together by any suitable form of clamping means that may be found desirable, but in the drawings there is illustrated a clamping means of that type comprising a plurality of radial lugs 12, 13 integral with the pipe sections and through which extend clamping bolts 14. Such form of clamping means is shown merely

for illustrative purposes, as I may use any other type of clamping means found most desirable for this purpose.

To aid in moving the ash current through the pipe line, I associate with the hard pipe section 10 a plurality of nozzles 15, 15, which project into such pipe section through holes or passages 16, 16 provided in the wall of the pipe section 10 for that purpose. Said holes or passages 16 are formed in the wall of the pipe section by coring during the casting of the same, as said pipe section 10 is made of a material of such hardness that it is impossible to cut said holes 16, 16 in the wall thereof by machining. As shown in Fig. 1, said holes or passages 16, 16 are each arranged at an angle of substantially 45° to the center line *a* of the pipe section, and are made larger than the nozzles 15 so as to permit the latter to be adjusted to the angular position required with respect to the center line of said pipe section. The space between each hole or passage 16 and the nozzle extending into the same is packed with a suitable packing 17, such as asbestos, to provide a fluid tight joint at such point. Located between the opposed ends of the pipe sections 10 and 11 is an annular ring or member 18 having an internal diameter substantially equal to the like dimension of the pipe section so that no portion of the ring projects into the conduit formed by the pipe sections. The outside diameter of the ring 18 is substantially the same as the like dimension of the pipe sections so that no portion of the ring except the ears or flanges 19, 19 project beyond the outside of the pipe sections. Said ring 18 is held between the opposed ends of the pipe sections 10, 11 by the means which serves to clamp the pipe sections together. The nozzles 15, 15 are secured to said lugs 19, 19, and the latter are arranged in such angular positions so that when the nozzles are properly secured thereto, said nozzles will be held in positions to discharge jets of steam or other fluid into the pipe section 10 at substantially the same angles to the center line *a* thereof, thereby causing the jets of steam to intersect at said center line and blend and produce a resultant effort along said center line, so that the ash current will not be distorted and be blown by one or more of the jets of steam against the inner surface of said pipe section 10 and there produce increased and undue wear. In the drawings, I have shown two nozzles 15, 15, the same being circumferentially spaced apart and arranged diametrically opposite each other. Manifestly, the ears or flanges 19 are likewise arranged, and when the ring 18 is clamped between the two opposed ends of the pipe section said ears or flanges 19 are arranged between the lugs 12 of the clamping means heretofore referred to. Each ear 19 is provided with an aperture or

hole 20 adapted to have threaded therein the base portion 21 of the nozzle. The ring 18 is made of a material that may be readily operated upon by machining, or, in other words, may be operated upon by metal cutting tools, and it follows that each hole 20 may be cut in the ears 19 at the angle required for properly holding the nozzle 15 in the position desired for the purpose of discharging into the pipe section 10. Manifestly, each nozzle 15 may be accurately alined with respect to the other and to the center line of the pipe section 10, for the purpose of permitting the nozzles to discharge jets of steam into the pipe section at the same angles to the center line thereof so that they will intersect at said center line and blend for the purposes stated. Should it happen during the operation of the system that one nozzle discharges a jet of steam at a greater velocity than the other, it follows that the ash current will be deflected from the center line of the pipe section 10 and caused to be blown against one side of the pipe section 10, which if not made of such a hard material as stated would be thereby subjected to undue wear until the pressure of the steam passing through the nozzles should be rectified and be brought to unison. Consequently, by providing the pipe section 10 into which the steam jets discharge of such a hard material the life of the pipe section is prolonged, in case it should happen during the operation of the system that the steam jets blow the ash current to one side of the pipe section. It is manifest that with soft gray iron pipe sections as heretofore used such blowing of the ash current against the walls of the pipe section is detrimental thereto and soon causes the same to be worn out, whereas with my invention such difficulties are readily overcome, with the result that the maintenance cost of the pipe line at the steam jets is materially reduced, in comparison with a like cost of those systems as heretofore installed provided with soft gray iron pipe sections at the steam jets. The ash current through any straight portion of the pipe line is along the axial longitudinal center line thereof, and consequently there is not a great deal of wear produced along the sides of those pipe sections intermediate the nozzle positions. By positioning the supporting rings 18 forward of the nozzles, said rings may be made of a soft material for the purposes stated, and furthermore are not subjected to undue wear, because the ash current is not distorted along the conduit where the supporting ring is located. It is particularly noted that with my construction the nozzles are supported by means other than the hard pipe section 10 and thus permit the making of such means of a material capable of being machined for accurately alining the nozzles and thus

avoid distortion of the ash current passing through such pipe section, particularly at the point of intersection of the steam jets discharged into the pipe section by the nozzles. In Fig. 1, there is shown for illustrative purposes a conduit 22 connected with each nozzle for leading steam or the like thereto.

While I have shown a means embodying the features of my invention for supporting two diametrically opposed nozzles in a straight pipe section, it is of course to be understood that my invention may be readily adapted to support one or more nozzles, and further may be used in those parts of the pipe line where bends or curves are provided for changing the direction of flow of the ash current therethrough, for instance at elbow fittings, which are usually employed where a change of direction of flow is necessary. Moreover, while I have shown the nozzles 15, 15 each arranged at an angle of 45° to the center line *a*, it is of course to be understood that I may arrange the nozzles at any other angles found desirable.

Although I have shown and described in detail herein one preferred form of my invention, yet it is of course to be understood that the various details of construction and arrangement of parts may be variously changed and modified without departing from the spirit and scope of my invention, and I do not wish to be limited to the details of construction and arrangement of parts illustrated, except as pointed out in the appended claims.

I claim as my invention:

1. In an ash conveying or like system, a pipe section made of a material of such hardness that it cannot be operated upon by machining, said pipe section having a hole therein, a nozzle projecting into said hole, and means other than said pipe section for supporting said nozzle.

2. In an ash conveying or like system, a pipe section made of a material of such hardness that it cannot be operated upon by machining, said pipe section having a hole therein, a nozzle projecting into said hole, and a member other than said pipe section for supporting said nozzle, said member being made of a material that may be operated upon by machining so that the nozzle may be secured thereto at the angle required for properly discharging into said pipe section.

3. In an ash conveying or like system, a pipe section made of a material of such hardness that it cannot be operated upon by machining, said pipe section having a hole therein, a nozzle projecting into said hole, and a member other than said pipe section for supporting said nozzle and provided with an aperture in which said nozzle is secured, said member being made of a material that may be operated upon by machin-

ing so that said aperture may be made at the angle required for holding the nozzle in proper discharging position.

4. In an ash conveying or like system, a pipe section made of a material of such hardness that it cannot be operated upon by machining, said pipe section having a plurality of holes therein, a nozzle projecting into each of said holes, and means other than said pipe section for supporting said nozzles and being made of a material that may be operated upon by machining so that said nozzles may be secured to said means at the angles required for holding them in proper discharging position.

5. In an ash conveying or like system, a pipe section made of a material of such hardness that it cannot be operated upon by machining, said pipe section having a plurality of circumferentially spaced holes therein, a nozzle projecting into each of said holes, and a member other than said pipe section for supporting said nozzles and being made of a material that may be operated upon by machining so that said nozzles may be secured to said member at the angles required for properly discharging into said pipe section.

6. In an ash conveying or like system, two alined pipe sections, one of said pipe sections having a hole extending through the wall thereof, a nozzle projecting into said hole, and means clamped between the opposed ends of said pipe sections for supporting said nozzle.

7. In an ash conveying or like system, two alined pipe sections, one of said pipe sections having a plurality of circumferentially spaced holes extending through the wall thereof, a nozzle projecting into each of said holes, and a member clamped between the opposed ends of said pipe sections for supporting said nozzles.

8. In an ash conveying or like system, two alined pipe sections, one of said pipe sections being made of a material of such hardness that it cannot be operated upon by machining and having a hole extending through the wall thereof, a nozzle projecting into said hole, and a member clamped between the opposed ends of said pipe sections for supporting said nozzle.

9. In an ash conveying or like system, two alined pipe sections, one of said pipe sections being made of a material of such hardness that it cannot be operated upon by machining and having a hole extending through the wall thereof, a nozzle projecting into said hole, and a member clamped between the opposed ends of said pipe sections for supporting said nozzle, said member having an outwardly projecting portion having an opening into which said nozzle is secured and being made of a material that may be machined so that said opening may be cut at

the angle required for holding the nozzle in proper discharging position.

10. In an ash conveying or like system, two alined pipe sections, one of said pipe sections being made of a material of such hardness that it cannot be operated upon by machining and having a hole extending through the wall thereof, a nozzle projecting into said hole, a member clamped between the opposed ends of said pipe sections for support-

ing said nozzle, and packing inserted in said hole about said nozzle.

In testimony that I claim the foregoing as my invention, I affix my signature in the presence of two witnesses, this 16th day of 15 March, 1918.

ARTHUR P. STRONG.

Witnesses:

HERAN INGRAM,  
H. R. WILSON.