D. A. LIVENSPARGER.

ASH CONVEYING SYSTEM.

APPLICATION FILED NOV. 2, 1917.

1,339,209. **Patented May 4, 1920.**

Fig. 1.

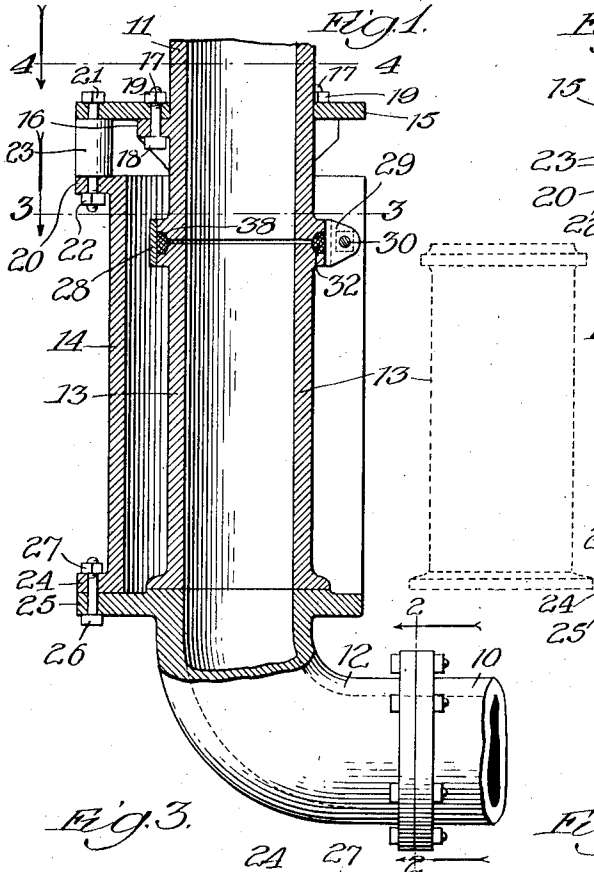


Fig. 2.

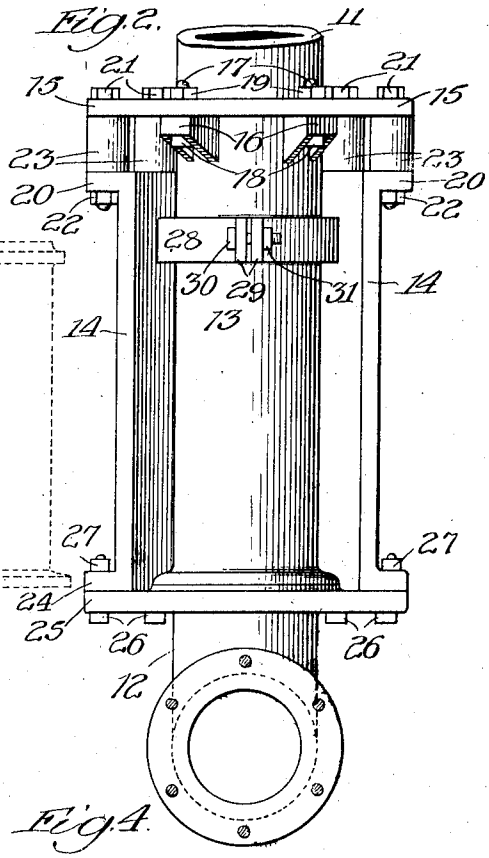


Fig. 3.

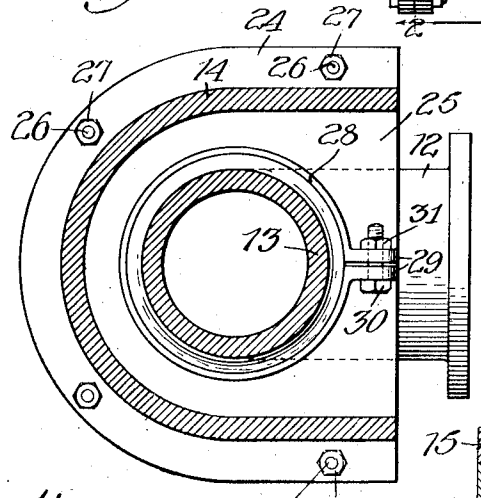


Fig. 4.

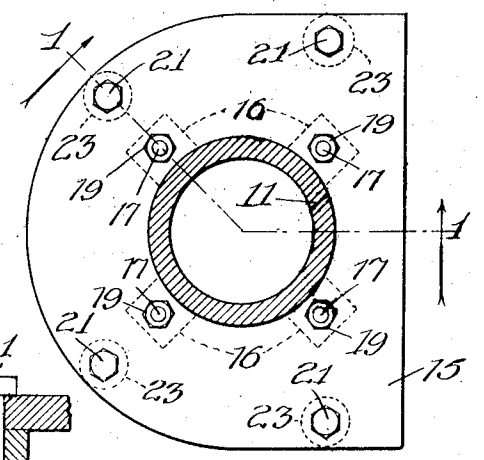
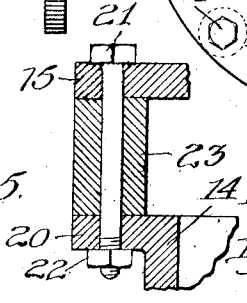


Fig. 5.



Witnesses:

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UNITED STATES PATENT OFFICE.

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ASH-CONVEYING SYSTEM.

1,339,209. Specification of Letters Patent. Patented May 4, 1920.

Application filed November 2, 1917. Serial No. 199,930.

To all whom it may concern:

Be it known that I, DANIEL A. LIVENSPARGER, a citizen of the United States, residing at Battle Creek, in the county of Calhoun and State of Michigan, have invented new and useful Improvements in Ash-Conveying Systems, of which the following is a specification.

This invention relates to improvements in pneumatic conveying systems for abrasive materials such as ashes and the like, and more particularly to a member forming part of the pipe line or conduit of such systems and designed to permit the alteration or replacement of portions of the pipe which are subjected to excessive wear or abrasive action, without disturbing the remainder of the system or the particular pipe line in which such alterations occur.

Conveying systems of the character referred to comprise metal pipes, through which the ashes or like abrasive materials are moved pneumatically. Such systems usually comprise connected vertical and horizontal, and even oblique lengths of pipe, thereby making it necessary to use elbows or like fittings at the sharp bends or turns in the pipe line. Not only the elbows are subjected to an excessive or unequal degree of wear, resulting from the increased abrasive action of the material that must necessarily occur where the direction of flow of the material is abruptly altered, but the straight pipe immediately beyond the elbow or bend and in the direction of flow of the material is also subjected to an excessive or unequal degree of wear by the abrasive action of the material moving thereagainst. To provide for the wear at this particular portion of the pipe line, it has been found desirable to employ a short pipe length which may be removed when worn and replaced with a new one.

In the Patent No. 1,211,500, granted January 9, 1917, to A. P. Strong, there is shown a construction comprising a spacing member adapted to space apart the opposed ends of two pipe sections so as to permit the insertion therebetween of a removable wear section. Said spacing member is provided with adjustable means whereby the spacing member may be elongated or expanded for further moving apart the opposed ends of the pipe sections between which it extends and is connected, in order to release the wear section and enable the same to be removed and be replaced by a new one. When the device shown in the Strong patent is employed in a vertical or upright portion of a pipe line, it becomes necessary to lift the entire weight of the vertical portion of the pipe line to release the wear section, and by that construction it is necessary to raise a considerable load before the removable section may be released.

Among the objects of my invention is to improve the construction of the device as set forth in said Strong patent and to provide in particular a spacing member of that type which will space apart the opposed ends of the pipe sections, between which the removable wear section is inserted, a predetermined and definite distance at all times, and thereby avoid the necessity of being required to apply pressure or force to further separate the opposed ends of such pipe sections in order to release the removable wear section. It is a further object of my invention to make the removable wear section of a length slightly less than the distance between the permanent pipe sections, so that the pipe line in which my device is used exerts no pressure or load on the removable wear section, with the result that the latter may be readily and easily removed when desired. In order to maintain the wear section in place and in proper alinement with the permanent sections, that end of the wear section which falls short of the adjacent end of the permanent pipe section is coupled to the latter by a coupling means, which includes packing for forming a fluid-tight joint between such parts.

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 of a construction embodying the features of my invention and taken on line 1—1 of Fig. 4;

Fig. 2 is a view in side elevation of the parts shown in Fig. 1;

Fig. 3 is a horizontal sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a like sectional view taken on line 4—4 of Fig. 1; and

Fig. 5 is a vertical sectional view of a detail of construction to be hereinafter referred to.

In the drawings, I have shown that part of an ash conveying system where one of the pipes 10 of a horizontal portion of the pipe line is connected with the adjacent pipe 11 of a vertical or upright portion of said pipe line by means of an elbow 12 and a pipe section 13 removably inserted between such parts. Extending between said elbow 12 and the vertical pipe 11 is a spacing member 14, the latter being constructed in accordance with my invention and adapted to be rigidly connected with the elbow 12 and the vertical pipe 11 for spacing the opposed ends of said pipes apart for receiving therebetween the pipe section 13. Said spacing member 14 is preferably made tubular in shape and provided along one side thereof with a vertical slot or opening extending the full length of the spacing member and being of a width sufficient to permit the pipe section 13 passing therethrough to be inserted into and removed from said spacing member. The spacing member 14 is preferably made substantially U-shaped in cross-section, as shown in Fig. 3, and is open at both ends, so that the lower end of the vertical pipe 11 may extend downward thereinto and also permit the upper end of the elbow 12 to extend upward into such spacing member.

For connecting the spacing member 14 with the vertical pipe 11, I surround said pipe above its lower end with an annular collar 15, the latter being supported on said pipe by a plurality of outwardly extending lugs 16 integral therewith. The collar 15 and the lugs 16 are provided with registering bolt holes, through which extend bolts 17 having their heads 18 in slotted portions of the lugs so as to hold the bolts against rotation. Clamping nuts 19 are applied upon the screw-threaded ends of the bolts extending beyond the collar 15. The spacing member 14 is provided at its upper end with an outwardly extending flange 20, said flange and the collar 15 thereabove being provided with registering bolt holes, through which extend bolts 21, the heads thereof bearing downward on the collar 15. Clamp nuts 22 are applied to the screw-threaded ends of the bolts below the flange 20, and in order to maintain the collar and flange 20 spaced apart, I interpose between such parts short tubular sections 23, through which the bolts 21 extend, as clearly shown in Fig. 5. The lower end of the spacing member 14 is provided with an outwardly projecting flange 24, which rests on a suitable flange 25 provided on the adjacent end of the elbow fitting 12. Said flanges 24 and 25 are provided with registering bolt holes, through which extend bolts 26 having applied thereto clamping nuts 27.

By the construction described, said spacing member 14 is rigidly connected with the pipe 11 and the elbow 12, and serves to space apart the opposed ends a predetermined and definite distance. Said spacing member is non-adjustable, that is, connot be extended lengthwise, and, therefore, the opposed ends of the pipe sections 11 and 12 are maintained spaced apart a fixed distance at all times. The pipe section 13 consists of a short length of pipe having an internal diameter equal to that of the sections 11 and 12, so that the conduit between such parts will be uniform. The thickness of the pipe section 13 may be standard, or even thicker, if desired, to provide more metal and thus increase the life thereof. As shown, the lower end of the pipe section 13 is flanged and rests upon the adjacent end of the elbow 12, the joint between such parts being made fluid-tight if found necessary. Said section 13 has a length slightly less than the distance that the opposed ends of the sections 11 and 12 are spaced apart by the spacing member 14, and when the section 13 is inserted into such space with its lower end resting on the upper end of the section 12, the upper end of the section 13 falls a trifle short of the adjacent end of the pipe section 11, as clearly shown in Fig. 1. By reason of this construction, it is possible to readily remove the section 13 when the same becomes worn, thereby permitting a new section to be readily inserted into such space without the necessity of raising the pipe section 11 or any of the connected pipes thereabove. To connect the upper end of the section 13 with the lower end of the section 11, I provide a coupling member, preferably in the form of a metal strap or band 28, which, as shown in Fig. 3, is split and has at its split ends outwardly extending flanges 29, 29, the latter being provided with bolt holes for the reception of a bolt 30 having applied at one end thereof a clamp nut 31. In order to seal the open joint between the upper end of the section 13 and the lower end of the pipe section 11 and prevent leakage of the fluid passing through the pipe line, I intend to pack such joint with a suitable packing 32. The metal strap 28 when clamped about the ends of such parts serves to maintain such packing in the proper position for the purpose set forth. As shown in Fig. 1, I groove the associated ends of the sections 11 and 13, so that the packing 32 may be readily placed in position to form a fluid-tight joint between such parts. When the section 13 becomes worn by abrasive action thereagainst

and it is desired to replace such section with a new one, all that is required is to remove the clamp nut 31 from the bolt 30, whereupon the band 28 is loosened and may be disengaged from the upper end of the worn section 13, thereby uncoupling such section from the pipe 11 and permitting said section 13 to be removed from between the sections 11 and 12. A new wear section may be then inserted into such space and the open joint packed and held in proper position by tightening the metal band or coupling member 28.

By the construction described, it is apparent that the opposed ends of the two permanent pipe sections between which the removable wear section is inserted are maintained spaced apart at a predetermined and definite distance at all times, not only during the time that the wear section is in use, but also during the time that the wear section is being removed and replaced by another. Very little effort is required to remove the wear section when worn and replace the same by a new one, and no effort need be made to displace either one of the permanent sections from their original position, either by endwise movement or by lateral movement. It is comparatively easy to remove the wear section when worn, as the only operation needed is to loosen the coupling member or metal strap 28 and remove the worn wear section. Consequently, very little labor is required, and the expense of removing the wear section is reduced to the minimum, as the weight of the pipe line of which the pipe 11 forms a part is on the spacing member 14 and not on the wear section 13. Moreover, when my spacing member is employed in the vertical or upright portion of a pipe line, it is unnecessary to first lift the weight of such pipe line from the wear section before the latter is released for removal.

While I have shown and described herein the wear section as in a vertical pipe line or riser of the system, it is to be of course understood that my invention is equally as applicable to other parts of the system, namely, the horizontal parts, or, in fact, at any point in the system where a wear section is needed, and with my spacing member it follows that the opposed ends of the permanent sections between which the wear section is placed are maintained spaced apart at a predetermined and definite distance at all times so that a short wear section may be readily removed therefrom when desired.

Although I have shown and described herein in detail one form of device embodying the features of my invention, yet it is to be of course understood that the details of construction and arrangement of parts shown 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 exact details of construction and arrangement of parts illustrated and described, except as pointed out in the appended claims.

I claim as my invention:

1. In a pipe line for conveying abrasive materials, the combination of two permanent pipe sections, means exterior of said pipe sections and extending between and connected therewith for maintaining the opposed ends thereof spaced apart the same distance at all times, and a third pipe section removably inserted between the separated ends of said permanent pipe sections and adapted to be detachably engaged therewith and having a length less than the distance that the opposed ends of said permanent pipe sections are spaced apart.

2. In a pipe line for conveying abrasive materials, the combination of two permanent pipe sections, means exterior of said pipe sections and extending between and connected therewith for maintaining the opposed ends thereof spaced apart the same distance at all times, a third pipe section removably inserted between the separated ends of said permanent pipe sections, said third pipe section having a length less than the distance that the opposed ends of said permanent pipe sections are spaced apart and having one end engaged with one of said permanent pipe sections and the other end terminating short of the other permanent pipe section, and means for detachably connecting such end of said third pipe section with the adjacent end of said permanent pipe section.

3. In a pipe line for conveying abrasive materials, the combination of two permanent pipe sections, a spacing member exterior of said pipe sections and extending between and connected therewith for maintaining the opposed ends thereof spaced apart the same distance at all times, a third pipe section removably inserted between the separated ends of said permanent pipe sections, said third pipe section having a length less than the distance that the opposed ends of said permanent pipe sections are spaced apart and having one end engaged with one of said permanent pipe sections and the other end terminating short of the other permanent pipe section to form an open joint between such parts, packing inserted in said joint, and a coupling member detachably connecting such end of said third pipe section to the adjacent end of said permanent pipe section.

4. In a pipe line for conveying abrasive materials, the combination of two permanent pipe sections, a spacing member having a fixed length and extending between

and connected with said two permanent pipe sections for maintaining the opposed ends thereof spaced apart the same distance at all times, and a third pipe section removably inserted between the separated ends of said two permanent pipe sections and adapted to be detachably engaged therewith and having a length less than the distance that the opposed ends of said two permanent pipe sections are spaced apart by said spacing member.

5. In a pipe line for conveying abrasive materials, the combination of two permanent pipe sections having their opposed ends spaced apart, a spacing member extending between said pipe sections and connected at one end with one of the same, a collar secured to the other of said two pipe sections beyond the adjacent end of said spacing member, tubular members having the same length and inserted between said collar and the adjacent end of said spacing member, fastening members inserted through said tubular members and engaging said collar and the adjacent end of said spacing member, a third pipe section removably inserted between the separated ends of said two permanent pipe sections and adapted to be detachably engaged therewith and having a length less than the distance that the opposed ends of said two permanent pipe sections are spaced apart by said spacing member.

6. In a pipe line for conveying abrasive materials, the combination of two permanent pipe sections arranged one above the other and having their opposed ends spaced apart, a third pipe section removably inserted between the separated ends of said two permanent pipe sections and having its lower end abutting against the upper end of the lowermost of said two permanent pipe sections and its upper end adapted to be coupled to the upper permanent pipe section, and a spacing member extending between and connected with said two permanent pipe sections for maintaining the opposed ends thereof spaced apart and for relieving said third pipe section of any of the weight of the pipe sections thereabove.

7. In a pipe line for conveying abrasive materials, the combination of two permanent pipe sections arranged one above the other and having their opposed ends spaced apart, a third pipe section removably inserted between the separated ends of said two permanent pipe sections and having its lower end engaging the lowermost of said two permanent pipe sections and with its upper end terminating short of the lower end of the uppermost of said two permanent pipe sections, a spacing member extending between and connected with said two permanent pipe sections for maintaining the opposed ends thereof spaced apart and relieving the third pipe section of any weight of the pipe sections thereabove, and a coupling member detachably connecting the upper end of said third pipe section with the lower end of the permanent pipe section thereabove.

8. In a pipe line for conveying abrasive materials, the combination of two permanent pipe sections arranged one above the other and having their opposed ends spaced apart, a third pipe section removably inserted between the separated ends of said permanent pipe sections, and means maintaining the upper pipe section spaced from the lower pipe section and relieving the third pipe section therebetween of any of the weight of the upper pipe section.

9. In a pipe line for conveying abrasive materials, the combination of two permanent pipe sections arranged one above the other, a third pipe section removably inserted between the separated ends of the permanent pipe sections, and means exterior of said pipe sections for maintaining the permanent pipe sections spaced apart and relieving the third pipe section therebetween of any of the weight of the upper pipe section.

10. In a pipe line for conveying abrasive materials, the combination of a riser, and an elbow spaced below the same, a third pipe section removably inserted between the riser and said elbow, and a spacing member exterior of said pipe sections and extending between and connected with said riser and elbow for maintaining the same spaced apart and relieving the third pipe section therebetween of any of the weight of the riser.

11. In a pipe line for conveying abrasive materials, the combination of a riser, and an elbow spaced below the same, a third pipe section removably inserted between said riser and elbow, and a spacing member comprising a hollow casing open along one side and extending between and connected with said riser and elbow for maintaining the same spaced apart and relieving the third pipe section of any of the weight of the riser.

12. In a pipe line for conveying abrasive materials, the combination of a riser, and an elbow spaced below the same, a third pipe section removably inserted between said riser and elbow, said third pipe section having a length less than the distance that the opposed ends of said riser and elbow are spaced apart, and having its lower end engaging said elbow and its upper end terminating short of said riser, a coupling member detachably connecting such end of said third pipe section to the lower end of said riser, and a spacing member comprising a

hollow casing open along one side and extending between and connected with said riser and elbow for maintaining the same spaced apart the same distance at all times, and for relieving the third pipe section of any of the weight of the riser.

In testimony that I claim the foregoing as my invention, I affix my signature, in the presence of two witnesses, this 16th day of October, A. D. 1917.

DANIEL A. LIVENSPARGER.

Witnesses:

EUGENE C. WANN,

CLARA L. PEOPLES.