April 7, 1925. 1,532,260

W. OSTHOFF

CLOTH SINGEING DEVICE

Filed Aug. 26, 1921 2 Sheets-Sheet 1

Fig. 1

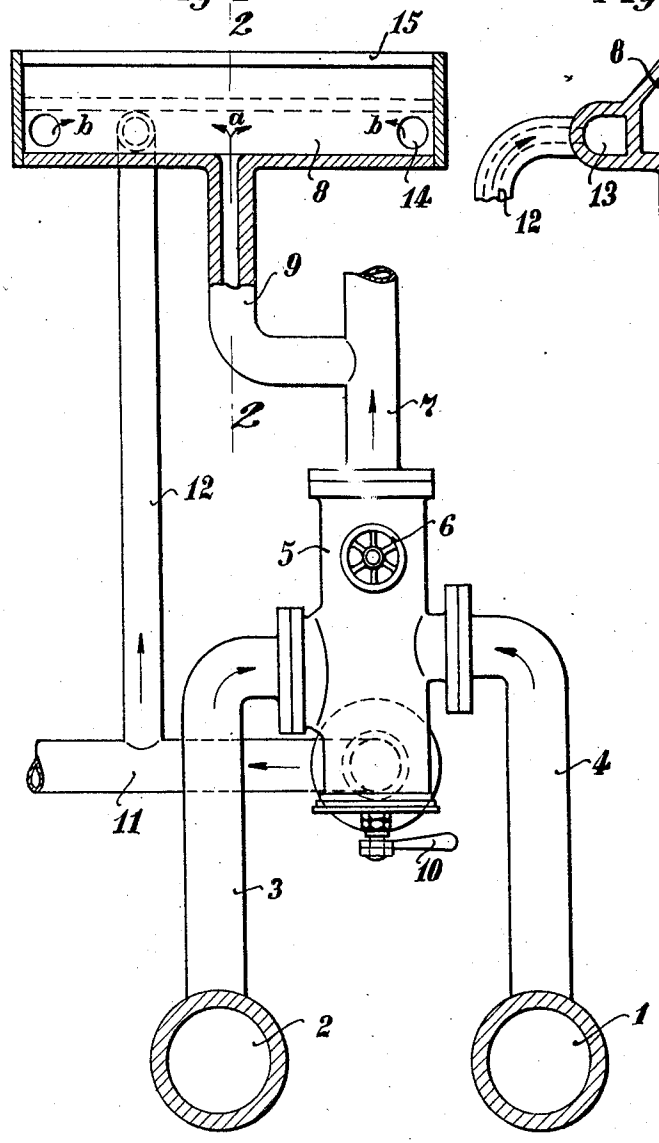


Fig. 2

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Fig. 3

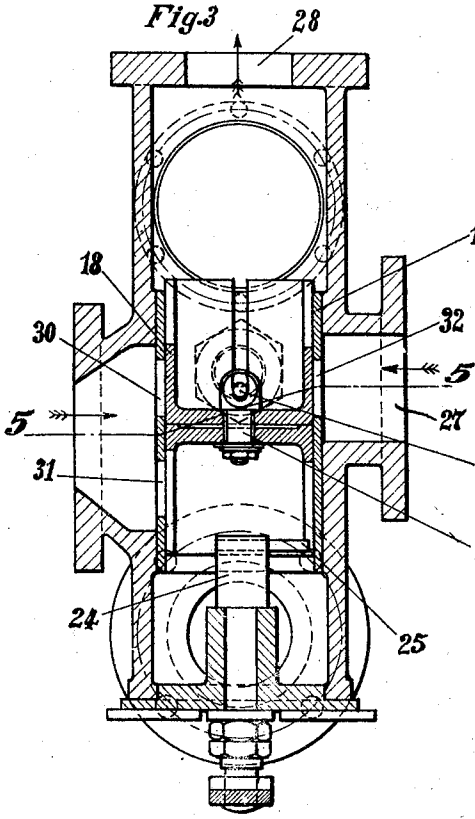


Fig. 4

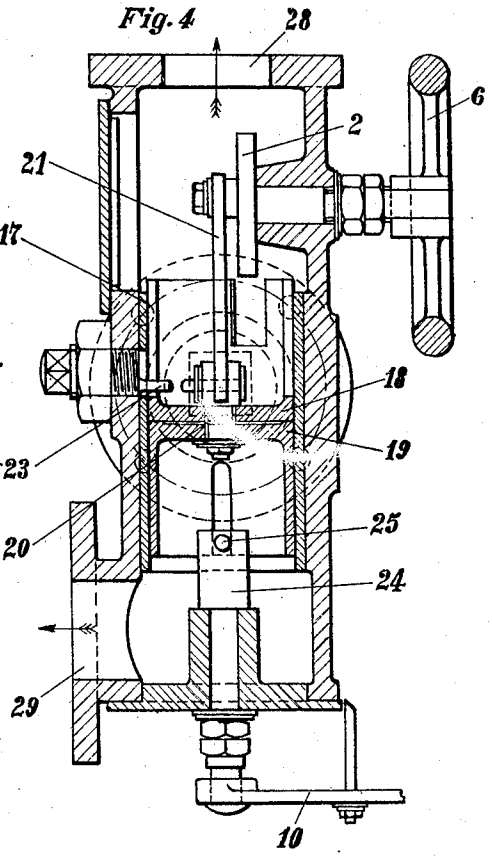
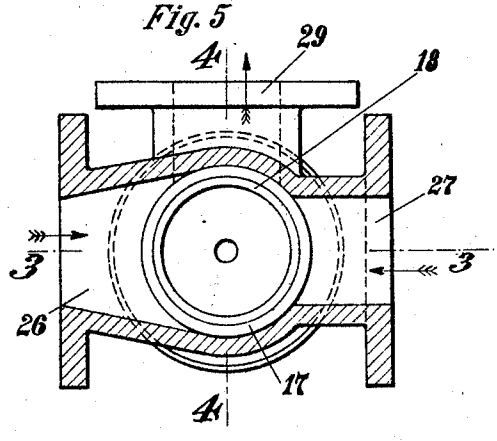


Fig. 5



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Patented Apr. 7, 1925. 1,532,260

UNITED STATES PATENT OFFICE.

WALTER OSTHOFF, OF BARMEN, GERMANY.

CLOTH-SINGEING DEVICE.

Application filed August 26, 1921. Serial No. 495,557.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, WALTER OSTHOFF, a citizen of the German Empire, residing at Barmen, Germany, have invented certain new and useful Improvements in Cloth-Singeing Devices (for which I have filed applications in Germany, Feb. 12, 1915, and Feb. 16, 1920, Patent Numbers 328,999 and 328,393; England, filed June 6, 1920; France, filed March 6, 1921; Switzerland, filed March 29, 1921), of which the following is a specification.

My invention refers to the singeing of fabric and more especially to a process and apparatus by which, the width of the gas flames can always be adapted to the width of the fabric that is being singed at any time and the intensity of the flame also can be regulated according to the nature of the fabric.

When singeing cloths which are less wide than the width of the burners a considerable portion of the gas is wasted because the flames are too wide, and several arrangements have already been devised to overcome this disadvantage. These devices have however been entirely mechanical arrangements by which the outer ends of the slit in the burner have been shut off for a certain distance towards the centre by means of slides and the like. Cutting off a portion of the slit in the burner involves a waste of time as there are four to six burners on one machine and each burner must be adjusted separately. Arrangements of this kind involve the further disadvantage that burners of special construction are required, and it is further difficult to fix the sliding plates so tightly that a greater loss of gas does not take place at those parts of the burner which are not alight.

According to the present invention these difficulties are overcome in a simple way by filling that portion of the slit which is not required for singeing with compressed air in the following manner:

The combustible mixture of gas and air is fed to about the middle of the burners, so that in each burner it must expand to the right and left, in order to escape through the slit in the burner when combustion takes place. In order to prevent the combustible mixture from burning at a certain distance from the two outer ends of each burner, compressed air is admitted from both sides and thus fills up the space in the outer ends of the burner so that the combustible mixture which flows right and left from the centre can only expand over a certain distance. The combustible mixture will then escape through the centre portion of the burner while compressed air escapes at each outer end in proportions depending on the adjustment of the compressed air supply.

The regulation of the combustible mixture and the compressed air supplied to the individual burners can be effected in various ways.

In the drawings affixed to this specification and forming part thereof a combined mixing and distributing valve, embodying my invention is illustrated by way of example. In the drawings—

Fig. 1 is a diagrammatic representation of the device for carrying out the novel proccess,

Fig. 2 is a section on the line 2—2 of Fig. 1,

Fig. 3 a longitudinal section of the mixing and distributing apparatus on the line 3—3 of Fig. 5,

Fig. 4 a section on the line 4—4 of Fig. 5, and

Fig. 5 a cross-section on the line 5—5 of Fig. 3.

Referring to the drawings, 1 is a gas-compressor and 2 an air-compressor, the latter supplying the air necessary both for the production of the combustible mixture and also for cutting off a portion of the flames. Each of these compressors is connected by means of conduits 4 and 3, respectively, with a joint mixing and distributing device 5. The latter is fitted with a hand-wheel 6 for regulating the combustible mixture which flows through a main conduit 7 to the burners. In the example illustrated there is shown only one of the burners 8 which is connected with the conduit 7 by means of a branch conduit 9. The device 5 is also fitted with another hand-lever 10 for regulating the air for damping, which flows to the burners through a main conduit 11 and thence through separate branch conduits 12. The distributing conduit 12 for each burner leads into a channel 13 on the burner, and said channel is connected by means of an

aperture 14 at each end with the chamber for the combustible mixture.

The slit 15 which extends over the whole length of the burner forms the burner-opening.

With this apparatus the novel process forming the primary object of the present invention takes place in the following manner:

The necessary combustible mixture, consisting of a gaseous fuel and atmospheric air, is conducted through the mixture conduits 9 to the chambers in the burners 8. The point of admission of the combustible mixture is generally in the middle of the burner, so that the combustible mixture flowing out of the conduit 9 must expand outwards in the direction of the arrows *a* into the chamber of the burner 8 and through the slit 15 on top of the burner where combustion takes place. By a corresponding adjustment of the hand-wheel 6 the combustible mixture is admitted to the burner 8 in the quantity necessary for singeing the material. As long as the compressed air conduit 11 is kept closed by means of the lever 10, no conduction of compressed air to damp the flames takes place.

In this case all the flames on the burners which are connected up burn along the whole width of the burner, so that the width of material that can be singed is as wide as the apparatus allows. If materials are to be singed which are narrower than the width of the singeing slit, then the attendant by turning the lever 10 allows compressed air to flow through the conduits 11 and 12 to the ends of the burners. The compressed air expands in the direction of the arrows *b* against both sides of the columns of combustible mixture which are in the burners with the result that the flames at the outer ends of the burners are uniformly extinguished and withdraw from both sides towards the centre for a distance which depends on the setting of the lever 10 so as to correspond with the narrower width of the material to be singed.

In order that the aforesaid method of working may be as perfect and as simple as possible it is necessary that both the air compressor and the gas compressor should be provided with exact pressure regulators, so that both the combustible mixture and the compressed air necessary to damp the flames are always supplied to the burners under the same pressure. When in operation therefore an alteration in the temperature or width of the flame cannot occur after the distributing apparatus has been adjusted. If the process is to be employed in fabric singeing apparatuses in which two pieces of cloth are being fed in side by side, the arrangement can be such that the combustible mixture conduit 9 for each burner is divided into two branches which are connected immediately to the right and left of the centre of the burner and of which either or both can be shut off or varied, so that the combustible mixture is conducted to the burner through two conduits which lie close together and either half of the burner can burn separately or they can both burn together as may be desired.

Should the case occur in which, when two pieces of fabric are being singed at the same time, the quality of the materials differs (for example a heavy fabric on the right hand side of the machine and a light fabric on the left) and each must consequently be operated upon with a different number of flames, it is then possible to operate on the right hand fabric with four flames and on the left with only two. In this case the left hand branch conduit for the combustible mixture must be shut off on two of the burners by means of a special cock or tap, so that only the right hand half of these two burners is supplied with the combustible mixture. At the same time the pressure of the air which serves to damp the flames of the two burners which are only alight across half their width must be adjusted to be so great that the space in the burners which, while singeing the lighter fabric cannot be charged with combustible mixture, is filled with compressed air.

In order to obtain a correct flow and distribution of gas in the burners special stops or guide plates may in some cases be provided.

The distribution apparatus is so constructed that by turning the hand-wheel 6, in order to regulate the width of the flames, the proportions of combustible mixture and compressed air for damping the flames are so altered that the total supply and therefore the intensity of the flames remains unchanged. Conversely by turning the handle 10 the total supply and therefore the intensity of the flames can be regulated independently of the width to which the flames have been adjusted at any time.

The preferred construction of the distributing apparatus 5 is shown in Figs. 3–5. It consists of a casing in which a cylindrical sleeve 17 is fixed. Two pistons 18 and 19 are movable in the cylinder 17 and are connected together by means of the bolt 20 so that while each can rotate independently about its longitudinal axis they can be moved together up and down (i. e. backwards and forwards) in the cylinder 17 by means of the connecting rod 21, which is attached to the link with which the bolt 20 is provided, and the crank or eccentric 22 which is connected to the hand-wheel 6. The piston 18 can be rotated (i. e. displaced sideways) independently of the piston 19 by

means of an eccentric bolt 23 which engages in a longitudinal groove in said piston, and the piston 19 can be rotated independently of the piston 18 and the bolt 20 by means of the lever 10 which is fitted to the member 24 provided with a pin 25 which engages in a longitudinal groove in the piston 19.

The compressed air conduit, from which in the example illustrated both the air necessary for the production of the combustible mixture as well as that for damping the flames is delivered, is connected to the flanged opening 26. The conduit for the compressed gas for the production of the combustible mixture is connected to the flanged opening 27 and the distributing conduit which feeds the combustible mixture to the burners to the flanged opening 28. The compresed air for damping the flame flows into the distributing conduit through the flanged opening 29.

Opposite the opening 26 the sleeve 17 has two rectangular openings 30 and 31 for the passage of the compressed air for the production of the combustible mixture and the compressed air for damping the flames respectively. Opposite the opening 27 the cylinder 17 is provided with a port 32 for the compressed gas. The area of the ports 30 and 32 is regulated by means of the piston 18, and that of the port 31 by means of the piston 19, the walls of said pistons 18 and 19 being provided with corresponding apertures.

In the drawings the apparatus is shown in the position in which the openings 30 and 32 for the admission of the air and gas for the production of the combustible mixture are closed completely, whereas the opening 31 for the admission of compressed air for damping the flames is fully open. By moving the handle 10 the opening 31 for the compressed air can also be completely closed, so that in this position of the apparatus neither the combustible mixture, nor the compressed air can reach the burners.

The apparatus is manipulated in the following manner:

The lever 10 is so adjusted that the port 31 for the compressed air for damping the flames is completely closed. In the position shown in the drawing with the pistons 18 and 19 at the top of their stroke both the openings 30 and 32 for the admission of the air and gas for the production of the combustible mixture would also be closed. It shall now be assumed that the composition of the mixture of gas and air has already been correctly adjusted by correspondingly opening the air port 30 and the gas port 32 by means of the eccentric bolt 23. This adjustment of the combustible mixture then always remains unaltered. By slowly turning the hand-wheel 6 the pistons 18 and 19 are moved downwards and the ports 30 for the compressed air and 32 for the compressed gas are accordingly opened, and the combustible mixture flows through the flanged opening 28 into the distributing conduit and thence to the burners. At each burner there is first formed a small flame which extends along its whole length and becomes continually larger as the ports 30 and 32 are opened further by turning the hand-wheel and thus moving the pistons 18 and 19 which are connected to it until said ports are fully open when the pistons have made a complete stroke and have reached their lowest position, whereupon a very fierce flame burns along the whole length of the burner. If however the flames are not required along the whole length of the burner compressed air for damping the gas flame is admitted on both sides by turning the handle 10 so that the piston 19 admits air to the conduit 31 until the width of the flame has been reduced so as to correspond with the width of the material to be singed.

Let us suppose now for example that a heavy material is to be operated on with a very fierce flame of a particular width. At first the position of the pistons is as shown in the drawing, but the lever 10 is so adjusted that the air conduit 32 for supplying the compressed air for damping the flames is fully open. When thus adjusted the necessary amount of compressed air for damping the flames, which when using the fiercest flame, would be required entirely to repress the combustible mixture is supplied to the burners. If now by turning the hand-wheel 6 the pistons 18 and 19 are moved downwards, the air port 30 and the gas port 32 are gradually opened and the air port 31 for regulating the supply of compressed air for damping the flames is simultaneously gradually closed. Assuming that the aforesaid apparatus is constructed for a burner width of 3 metres, and a 1 mm. opening of the air and gas ports 30 and 32 will produce an intense flame about 100 mm. in width in the middle of the burner. On opening the ports 30 and 32 wider and at the same time closing the air port (by turning the hand-wheel 6) the intense flames spreads continually outwards from the middle in accordance with the adjustment of the gas and air supply. The intensity of the flame however always remains uniform and is independent of its width. In correspondence with the resulting increase in the supply of combustible mixture the supply of compressed air for damping the flame is proportionately decreased. If during this procedure the intensity of the flames is also to be altered it is necessary to adjust the port 31 by means of the handle 10 until the desired intensity has been attained. If a particular intensity of flame has in this way been

obtained for a particular material it remains constant however much the width of the flames having this particular intensity are altered by means of the hand-wheel 6. By reason of this method of working the very important advantage is attained that when once the intensity or singeing effect of the flames has been adjusted so as to be constant at a desired degree the width of the flames can be altered at will.

Instead of the foregoing construction in which the flames are controlled by means of the ports 30 and 32 and the piston 18, the apparatus can also be constructed in such a way that the combustible mixture is supplied through the flanged opening 27 and the port 32. In this case the air port 30 is not provided in the cylinder 17. In this form of construction of the apparatus the method of working remains unchanged.

It is important that the supply of combustible mixture as well as of compressed air for damping the flames should be so regulated by means of an adjusting apparatus or valve, that when once adjusted the total supply remains constant no matter whether, in order to obtain a narrower flame, a smaller amount of combustible mixture and a greater amount of compressed air is fed to the burners or whether other variations in the proportions are involved. Independently of this the total supply must be capable of being adjusted to any desired extent. By means of the aforesaid apparatus all these requirements may be easily satisfied.

I claim:

1. The described method of controlling the lateral extent of a sheet-flame, which comprises causing a non-inflammable pressure gas to crowdingly act in lateral direction upon the flame at its base.

2. The described method of controlling the lateral extent of a sheet-flame, which comprises causing a non-inflammable pressure gas to compressingly act simultaneously on both narrow edges of the sheet-flame at the zone of its inception.

3. The described method of controlling the lateral extent of a pressure-gas sheet-flame, which comprises causing jets of non-inflammable pressure gas to crowdingly impinge simultaneously upon the base of both narrow edges of said flame, for throttling the latter between said jets as to its lateral extent, and correlating the pressure of said jets to that of the flame fuel.

4. In a device of the type set forth, in combination, a burner presenting a relatively extended narrow flame slot and having a port intermediate its ends for the admission of a combustible pressure gas and means spaced laterally from said fuel port for admitting a non-combustible pressure gas.

5. In a device of the type set forth, in combination, a burner presenting an elongated narrow flame slot and having a port intermediate its ends for admitting an inflammable gaseous pressure medium and a port near each end for admitting a non-inflammable gaeous pressure medium.

6. In a device of the type set forth, in combination, a burner presenting an elongated narrow flame slot and having a port intermediate its ends for admitting an inflammable pressure-gas and a port near each end for admitting a non-inflammable pressure gas, and means for interdependently controlling the supply of the pressure gases to the several said ports.

7. In a device of the type set forth, in combination, a burner presenting an elongated narrow flame slot and having a central combustible pressure-gas port and a pressure-air port at both ends, a gas and air controlling device, comprising a ported casing, two axially superimposed cylindrical ported valve slides in said casing, means for jointly axially reciprocating said ported slides, and means for rotating them independently of one another.

8. In a device of the type set forth, in combination, a burner presenting an elongated narrow flame slot and having separate-pressure gas and pressure-air ports, a gas and air controlling valve, respectively presenting a pressure-air intake, a pressure-gas intake, a pressure-air outlet, and a gas and air mixture outlet, conduits respectively connecting said pressure-air outlet to said air ports in the burner and said mixture outlet to said gas port, a fixed ported cylindrical seat in said valve, two axially superimposed cylindrical ported valve slides in swivel connection cooperating with said fixed seat, the one cylindrical slide intended to control the flow of pressure mixture, and the other the flow of pressure air and both said slides having a longitudinal slot, means for jointly axially reciprocating said two cylindrical slides within their seat, comprising a hand-wheel and link connection acting on the mixture-controlling valve slide, an eccentric in coaction with said longitudinal slot in the mixture-controlling slide for rotating the latter, and handlever means coacting with the said longitudinal slot in the air-controlling valve slide for rotating the latter, each valve slide being operable in rotary sense independently of the other, but both slides always jointly reciprocable in axial direction.

In testimony whereof I affix my signature.

WALTER OSTHOFF.