June 22, 1937. S. E. ALLEN 2,084,719

FIRE EXTINGUISHING APPARATUS

Filed Dec. 22, 1934 2 Sheets-Sheet 1

Fig. 1

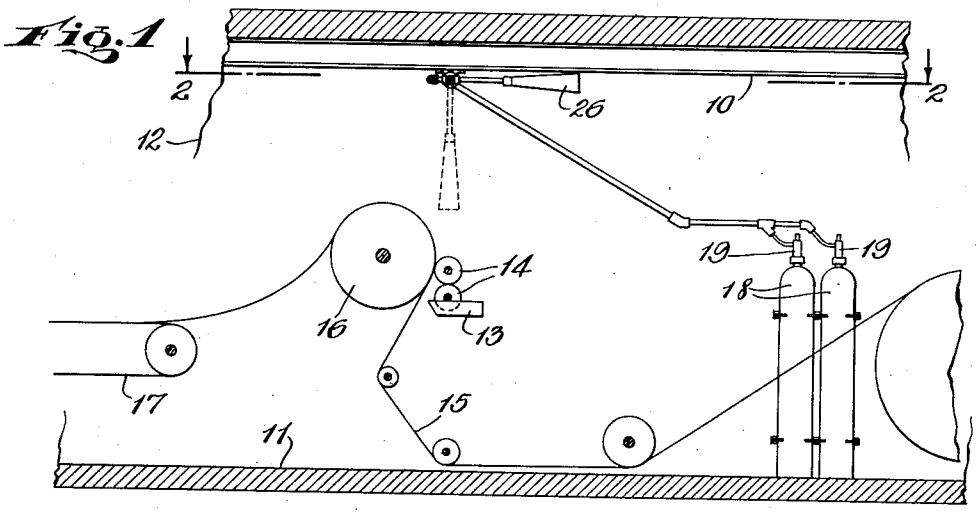


Fig. 2

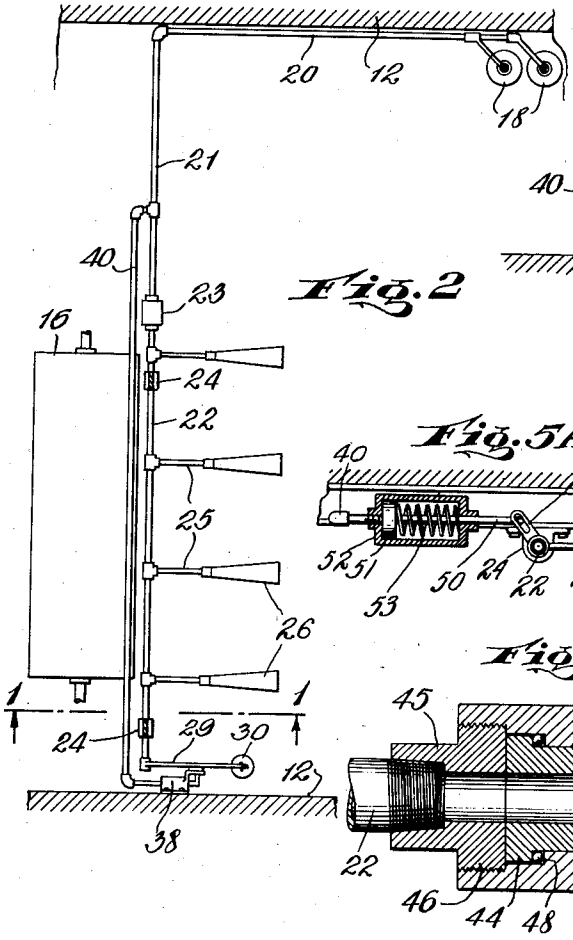


Fig. 3

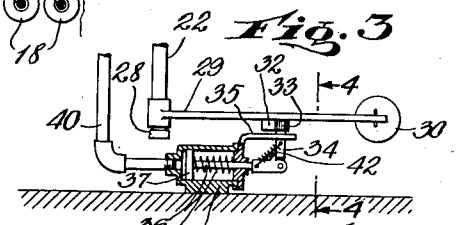


Fig. 4

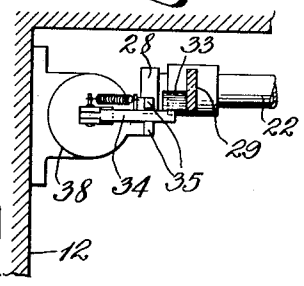


Fig. 5A

Fig. 5

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FIRE EXTINGUISHING APPARATUS

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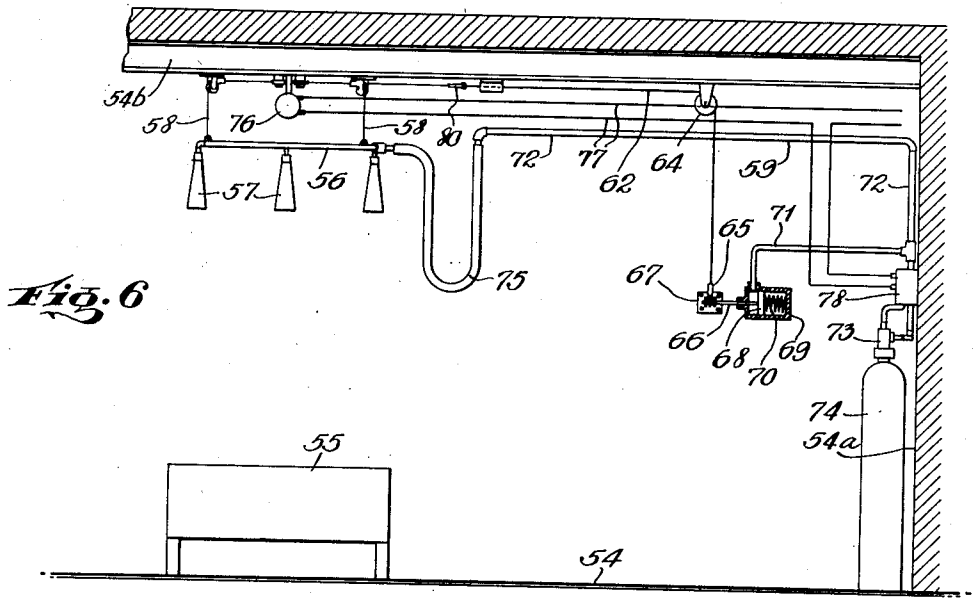


Fig. 6

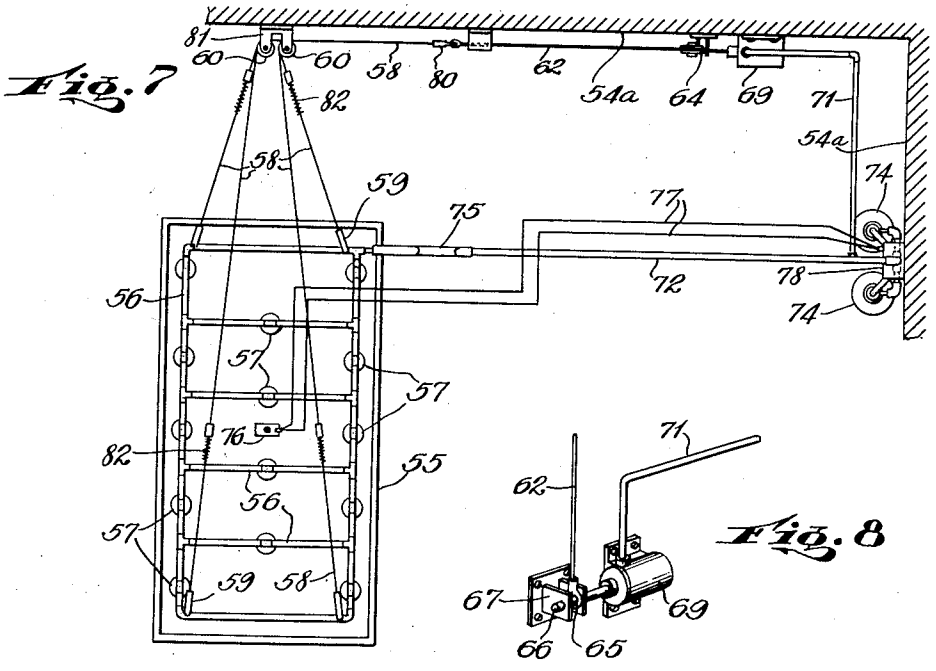


Fig. 7

Fig. 8

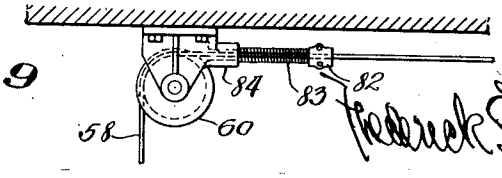


Fig. 9

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FIRE EXTINGUISHING APPARATUS

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Application December 22, 1934, Serial No. 758,808

14 Claims. (Cl. 169—11)

The present invention relates to the art of extinguishing fires and more particularly to fixed fire extinguishing systems wherein the extinguishing agent is conveyed by a system of piping to the region to be protected.

With certain fire extinguishing fluids of low specific gravity it is necessary to discharge the fluids comparatively close to the point where the fire is likely to occur so that they will not be carried off by the natural draft produced by the fire. In the case of liquefied carbon dioxide there is sufficient pressure to direct a stream of the fluid to a considerable distance but such a stream because of its high velocity would entrain large volumes of air so that if directed against a fire it would actually fan the blaze and cause it to burn with greater intensity. To overcome this difficulty it is customary to discharge jets of carbon dioxide into expansion tubes or horns which are adapted to shield the discharging stream of carbon dioxide from the surrounding air up to a point where its velocity is so reduced that it will not entrain any substantial amount of air. The discharge from the horns is usually a mixture of carbon dioxide snow and gas and since the discharge has lost much of its velocity it cannot be directed to a fire from any great distance.

In some cases, it is most inconvenient if not practically impossible to have a horn or a battery of horns permanently installed in the most advantageous fire fighting position. It is, therefore, an object of the present invention to provide a fire extinguishing system with discharge outlets for the extinguishing medium arranged to be moved from a convenient normal location to an effective fire fighting position.

Another object of the invention is to provide automatic means for causing such effective positioning of the discharge outlets in case of fire.

Another object is to provide gravity actuated means for lowering the discharge devices from a position near the ceiling of a room to a position directly over the fire hazard.

Another object is to provide means operated by pressure of the extinguishing fluid for releasing the discharge means so that it may drop by gravity to fire fighting position.

Another object is to provide thermo-sensitive means which will initiate the discharge of the fire extinguishing agent and the positioning of the discharge devices.

With these objects in view and others which will appear hereinafter, I shall now describe certain embodiments of my invention and thereafter shall point out the novelty and scope of the invention in the claims.

In the accompanying drawings;

Figure 1 is a somewhat diagrammatic sectional side elevation of my invention as applied to the protection of a dipping trough of a linoleum manufacturing apparatus, the section being taken on line 1—1 of Fig. 2;

Fig. 2 is a fragmental sectional plan view, the section being taken on line 2—2 of Fig. 1;

Fig. 3 is a detail view, partly in section, of a fluid actuated release device;

Fig. 4 is a view in section taken on the line 4—4 of Fig. 3;

Fig. 5 is a detail view in longitudinal section of a swivel coupling employed in the apparatus shown in Figs. 1 and 2;

Fig. 5*a* is a detail view in longitudinal section of a modification, comprising a fluid actuable means for moving the discharge devices to fire fighting position;

Fig. 6 is a view of another installation in which a battery of discharge devices is dropped bodily over a hazard in case of fire;

Fig. 7 is a plan view of the same;

Fig. 8 is a detail view in perspective of a release device employed in the apparatus shown in Figs. 6 and 7; and

Fig. 9 is a detail view in side elevation of a resilient stop which may be used for the battery of discharge devices shown in Figs. 6 and 7.

In Figs. 1 and 2, I have used numerals 10, 11 and 12 to designate the ceiling, floor and side walls of a room in which is located a linoleum coating apparatus. This apparatus comprises a dip trough 13 containing enamel or other coating fluid which is picked up by rolls 14 and applied to a continuous length 15 of linoleum which passes over a drum 16 to a conveyor 17. The fluid in the trough 13 is inflammable and a serious fire hazard. As a protection against this hazard I provide means for discharging carbon dioxide gas and snow directly upon the trough 13, rolls 14 and drum 16. Obviously, since workmen must attend the operation of this coating apparatus it would be impracticable to provide a fixed system of discharge horns or other discharge devices depending from the ceiling to a point directly over the fire hazard and near enough thereto to extinguish a fire. My invention provides instead an extinguishing apparatus comprising discharge horns which are normally folded up against the ceiling 10, but which, in case of fire, may be swung downwardly to effective fire fighting position.

The fire extinguishing medium used may be of any suitable nature but preferably I employ liquefied carbon dioxide which is contained in a battery of cylinders 18. This battery may be located adjacent one of the side walls 12. Each cylinder is provided with a suitable discharge head 19 operable to discharge the carbon dioxide into a conduit 20. The latter leads along one of the side walls 12 to the ceiling 10 and thence extends across the room above the fire hazard. This extension of the conduit which runs along the ceiling comprises a fixed part 21 and a part 22 directly overlying the rollers 14, which is connected to the part 21 by a swivel coupling 23 so that it may turn on its longitudinal axis. Suitable bearings 24 for the part 22 are attached to the ceiling.

Projecting laterally from the pipe 22 are short pipes 25, each terminating in a nozzle (not shown) opening into a horn 26. The end of the pipe 22 remote from the coupling 23 is closed by a plug 28 and is provided with a laterally extending arm 29 which carries a counterweight 30 at its free end. As shown in Figs. 3 and 4 the arm 29 is provided on one side with a lug 32 having a downwardly and outwardly sloping end face 33. The lug 32 normally rests upon a latch 34 which passes through a slotted guide 35 and is pivoted to the outer end of the stem 36 of a plunger 37. The latter is fitted to slide in a cylinder 38 supported on the adjacent side wall 12. A spring 39 normally presses the plunger 37 toward the left, as viewed in Fig. 3. However, the piston may be moved by fluid pressure in the opposite direction to withdraw the latch 34 from the lug 32. This fluid pressure is supplied through a branch pipe 40 which is connected to the fixed part 21, of conduit 20, as shown in Fig. 2.

In operation, whenever fluid is admitted from the cylinders 18 into the pipes 20 and 21 it will be led through pipe 40 the cylinder 38, pushing the piston outwardly and moving the latch 34 clear of the lug 32. This will permit the counterweight 30 to swing the horns 26 from the position shown in full lines in Fig. 1 to the dotted line position so that they will be directed against the rollers 14 and trough 13 and extend to a point very close thereto. The fire extinguishing medium discharging from these horns will then extinguish any blaze in the trough 13, or, on rollers 14 in the linoleum 15 passing over the drum 16. After the discharge of fluid has ceased the spring 39 will force the piston 37 back to the position shown in Fig. 3. The arm 29 may then be swung up manually, and the tapered face 33 will cause the latch 34 to swing outwardly on its pivot, against the pull of a spring 42, until it can snap back under the lug 32 to hold the battery of horns 26 in their normal idle position.

The swivel coupling 23 is preferably of ball bearing type, so as to facilitate movement of the battery of horns to and from operative position. A preferred form of coupling is shown in Fig. 5. It will be observed, that the pipe 21 is threaded into a tubular member 43 which terminates in a shouldered head 44. Similarly the pipe 22 is threaded into a tubular member 45 which terminates in a threaded head 46. A coupling sleeve 47 fits upon the member 43 but clears the head 44 and is screwed upon the head 46. A set of bearing balls 48 is located in a suitable raceway formed between the head 44 and the coupling sleeve 47.

Instead of depending upon gravity to move the horns to fire fighting position, fluid actuable means may be employed for this purpose. Such means may take the form shown in Fig. 5*a*. Instead of the arm 29 the pipe 22 is fitted with a crank 49 which is suitably connected to the stem 50 of a plunger 51 which operates in a cylinder 52. A spring 53 acting on the plunger holds the parts normally in the position illustrated but when extinguishing fluid is admitted from pipe 40 into the cylinder the plunger will be forced to the right, as viewed in Fig. 5*a*, swinging the horns to vertical position. When the fluid is exhausted the spring will return the horns to their normal idle position.

The apparatus shown in Figs. 6 and 7 differs from that shown in Fig. 1, mainly in the fact that the discharge devices, instead of being oscillated into operative position, are permitted to drop bodily into such position. I have used the characters 54, 54*a* and 54*b* to indicate the floor, sidewalls and ceiling respectively, of a room in which the fire extinguishing apparatus is installed. In this room the fire hazard may consist of a vat 55 containing an inflammable liquid. Located directly above this fire hazard is a frame work of piping 56 which is adapted to be connected with the source of supply of fire extinguishing fluid and which is provided with depending discharge horns 57. A set of wires or cables 58 supports the frame 56. These cables pass over corner pulleys 59 mounted on the ceiling and thence run to pulleys 60 adjacent one of the side walls 53. The wires after passing around these pulleys are coupled to a cable 62 which is guided horizontally along the side wall adjacent the ceiling and thence passes over a pulley 64 and extends downwardly terminating in an eye 65 through which passes a pin 66.

The pin 66 has sliding support in a bracket 67 secured to the side wall, and constitutes the stem of a plunger 68 which is fitted to slide in a cylinder 69. A spring 70 normally urges the plunger outwardly or to the left, as shown in Fig. 6, but the plunger may be forced in the opposite direction by fluid admitted through a pipe 71 to withdraw the pin 66 from the eye 65, thus releasing the cable 62 and permitting the battery of horns 57 to drop to a position directly over the vat 55.

The pipe 71 is connected to the main conduit 72 which extends from discharge heads 73 of a battery of cylinders 74 containing the compressed fire extinguishing medium. The opposite end of the conduit 72 is connected by a flexible hose 75 to the system of piping 56 so as to lead the fire extinguishing medium to the discharge horns 57.

The discharge of fluid into the pipe 72 may be initiated by manual means of any well known type and also I may employ thermo-sensitive means for initiating such discharge. To this end, I provide a thermostatic switch 76 in the circuit 77 of mechanism 78 for operating the discharge heads 73. The switch is located at any suitable point, preferably directly above the vat 55, so that as soon as the temperature rises above a predetermined point it will effect the discharge of the cylinders 74. When such discharge takes place the piston 68 will be operated to release the cable 62 and permit the horns to drop. The horns will drop until the fitting 80 at the end of the wires 58 strikes the bracket 81 supporting the pulleys 60. In order to take up shock due to the sudden arrest of the battery of horns, springs 83 may be provided in the supporting wires 58.

A further means of cushioning the sudden stop of the battery of horns is shown in Fig. 9. Here the wires **58** are shown as passing through a collar **82** which is urged outwardly by a spring **83** disposed between this collar and a bracket **84** of one of the pulleys **60**. When the fitting **80** strikes the collar **82** it will compress the spring **83** and cause a comparatively gradual stop of the falling battery of horns.

While no means are shown in Fig. 1 for automatically discharging the cylinders **18**, it will be obvious that in this case also a thermostatic control may be provided such, for instance, as that shown in Figs. 6 and 7, such control serving to set off the discharge either when the temperature rises above a predetermined degree or else when the rate of rise of temperature is above that which would occur under normal conditions.

While I have described certain embodiments of my invention it will be understood that these are to be taken as illustrative and not limitative and that I reserve the right to make various changes in form, construction and arrangement of parts without departing from the spirit and scope of my invention as pointed out in the following claims.

I claim:

1. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a movable discharge device biased to move into operative position with respect to said area, a latch normally retaining the device in inoperative position, and means for simultaneously supplying said device with fire extinguishing fluid and releasing said latch.

2. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a movable discharge device biased to move into operative position with respect to said area, a latch normally retaining the device in inoperative position, means for simultaneously supplying said device with fire extinguishing fluid and releasing said latch, a stop for stopping the device in operative position and resilient means for absorbing shock when the device is checked by the stop.

3. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a movable discharge device biased to move into operative position with respect to said area, a latch normally retaining the device in inoperative position, means for simultaneously supplying said device with fire extinguishing fluid and releasing said latch, and a spring buffer for stopping the device in operative position.

4. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a movable discharge device biased to move into operative position with respect to said area, a latch normally retaining the device in inoperative position, means for supplying said device with fire extinguishing fluid under pressure, and means actuable by said fluid for withdrawing said latch.

5. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a discharge device movable by gravity into operative position with respect to said area, a latch normally holding the device in inoperative position, means for supplying the discharge device with fluid under pressure, and means automatically operable by said fluid when supplied to the discharge device to release said latch.

6. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a discharge device mounted to swing by gravity to operative position immediately overlying said area, a latch normally retaining the device in inoperative position, and means for simultaneously supplying said device with fire extinguishing fluid and releasing said latch.

7. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a discharge device mounted to swing by gravity to operative position immediately overlying said area, a latch normally retaining the device in inoperative position, means for simultaneously supplying said device with fire extinguishing fluid and releasing said latch, and a control for actuating said means in response to a predetermined temperature change adjacent said area.

8. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a discharge device mounted to swing by gravity to operative position immediately overlying said area, a latch normally retaining the device in inoperative position, means for supplying said device with fire extinguishing fluid under pressure, and means actuated by the pressure of said fluid for releasing said latch.

9. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a rotatable conduit mounted substantially horizontally above said area, discharge horns connected to and projecting laterally from the conduit, biasing means tending to turn the conduit and direct the horns substantially vertically toward the fire, a latch normally holding the conduit in a position in which the horns extend substantially horizontal, fluid actuable means for releasing the latch, and means for supplying the conduit and said fluid actuable means with fire extinguishing fluid under pressure.

10. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a rotatable conduit mounted substantially horizontally above said area, discharge horns connected to and projecting laterally from the conduit, biasing means tending to turn the conduit and direct the horns substantially vertically toward the fire, a latch normally holding the conduit in a position in which the horns extend substantially horizontal, fluid actuable means for releasing the latch, a fluid conduit arranged to supply said rotatable conduit and said fluid actuable means with fire extinguishing fluid under pressure, and a fluid tight ball-bearing coupling connecting the rotary conduit and the fixed conduit.

11. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a plurality of discharge horns movable by gravity from a normal idle position remote from said area to an operative position close to said area, a latch normally holding the horns in idle position, and means for simultaneously supplying the horns with fire extinguishing fluid and releasing said latch.

12. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a plurality of discharge horns suspended above the area and movable by gravity from a normal idle position remote from said area to an operative position close to said area, a latch normally holding the horns in idle position, means for simultaneously supplying the horns with fire extinguishing fluid and releasing said latch, a stop for limiting the drop of the horns when they reach operative position, and resilient means for

absorbing the shock when the horns are checked by the stop.

13. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a plurality of discharge horns suspended above the area and movable by gravity from a normal idle position remote from said area to an operative position close to said area, a latch normally holding the horns in idle position, means for simultaneously supplying the horns with fire extinguishing fluid and releasing said latch, and a spring buffer for checking the drop of the horns when they reach operative position.

14. A fire extinguishing apparatus for protecting a predetermined area, said apparatus comprising a plurality of discharge horns suspended vertically above the area and movable by gravity from a normal idle position remote from said area to an operative position close to said area, a latch for holding the horns in idle position, fluid actuable means for releasing the latch and permitting the horns to drop to operative position, mean for supplying the horns and said fluid actuable means with fire extinguishing fluid under pressure, means for arresting the horns at the operative position, and means for absorbing the shock when the drop of the horns is arrested.

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