Nov. 14, 1950 M. H. COWAN 2,530,001

FIRE EXTINGUISHER

Filed Aug. 2, 1948

Fig. 1.

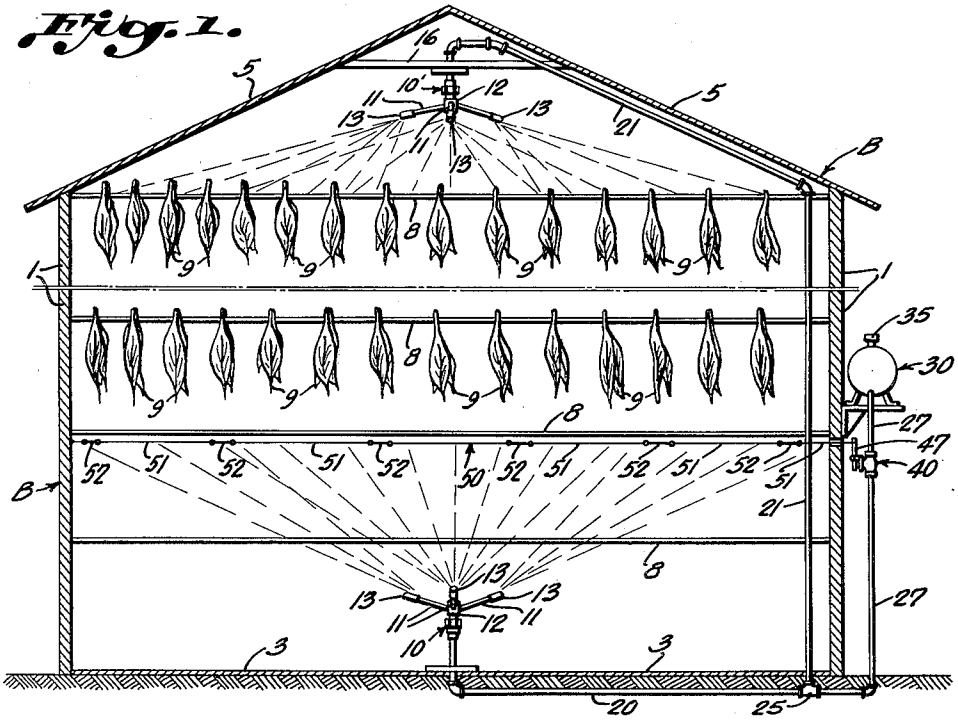
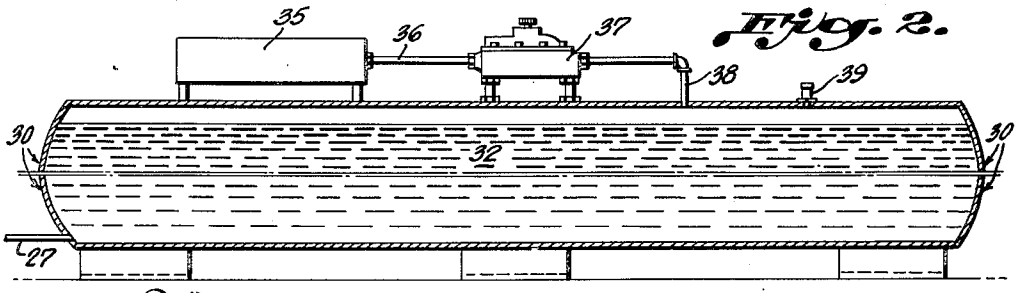


Fig. 2.



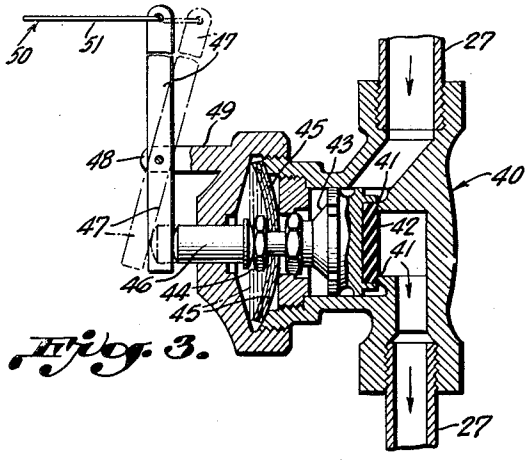
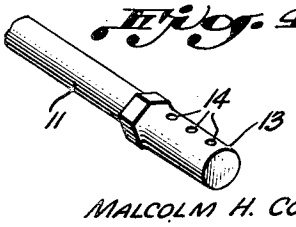


Fig. 3.

Fig. 4.



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FIRE EXTINGUISHER

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3 Claims. (Cl. 169—9)

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This invention relates in general to fire extinguishers and deals, more particularly, with improvements in fire extinguishers designed for use in tobacco curing barns, and the like, for protection against fire while tobacco is in the process of curing or drying.

In the curing of tobacco, it is a common practice to suspend or otherwise attach bunches of loose tobacco leaves along the lengths of rods or sticks which are mounted in a tobacco curing barn or shed in closely spaced parallel relation in the manner of horizontal tiers. In any such arrangement of the tobacco for drying in a tobacco curing barn, the tobacco is more or less in the form of a large composite mass of tobacco leaves which presents a special problem in providing for protection against the constant danger of a sudden fire that might rapidly consume the valuable tobacco and destroy the tobacco barn.

The use of the well known fused or fixed type sprinkler heads arranged in rows along the tiers of hung tobacco leaves is unsatisfactory inasmuch as the fixed sprinkler heads are surrounded on all sides by the suspended tobacco which necessarily restricts the spray of the extinguishing fluid to only relatively small areas. Likewise, the use of fused or other fixed type sprinkler heads along the roof of the tobacco curing barn is inadequate and unsatisfactory due to the fact that any fire occurring in the lower area of the barn would burn upwardly through the valuable tobacco before the fused sprinkler heads are set in operation. Moreover, the use of fixed sprinkler heads requires a considerable number of individual sprinklers and an elaborate system of pipes which makes any such installation entirely too costly and the use thereof prohibitive in instances which warrant only an inexpensive fire extinguisher.

The fire extinguisher of the present invention is especially designed for use in tobacco curing barns, and the like, to overcome the foregoing problems and insufficiencies, and a primary object of the invention is to provide highly simplified fire extinguisher apparatus and arrangement which is relatively cheap and inexpensive and may be installed readily in any existing tobacco barn or included in any new tobacco barn structure at relatively low cost and expense.

The apparatus is particularly advantageous from a cost standpoint in that most installations require only a pair of inexpensive rotary sprinklers which are mounted adjacent the roof and floor, respectively, of the tobacco curing

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barn and which, in the case of fire, are arranged to spray the fire extinguishing fluid over relatively wide areas simultaneously from both the top and bottom of the tiers of hung tobacco to provide what may be termed a compression effect of the sprayed fire extinguishing fluid on any fire within the barn to extinguish the same quickly and positively. Another object of the invention, therefore, is to provide a fire extinguisher of the character described which includes the novel arrangement of cooperating sprinklers or sprays arranged at both the top and bottom of a building structure such as a tobacco barn, and which comprises, further, rotary jet-type sprinklers which are adapted to throw a greater volume of fire extinguishing fluid and spray the same over relatively large areas in the most effective manner.

A further object of the invention is to provide a fire extinguisher of the kind aforesaid, which is automatically set into operation in the case of a fire and in which the fire extinguishing fluid is supplied to the rotary sprinklers under pressure in such a way that a maximum volume of the fluid is diffused as quickly as possible to extinguish any fire in the shortest time and in the most effective manner.

Further objects and advantages and other new and useful features in the construction, arrangement and general combination of parts of the invention will be readily apparent as the following description proceeds with reference to the accompanying drawings, for purposes of illustration but not of limitation in which like reference characters designate like parts throughout, and in which:

Fig. 1 is a vertical sectional view through a tobacco barn, or the like, showing the general organization of the fire extinguisher of the invention in which rotary type sprinklers are arranged for spraying the fire extinguishing fluid from both the top and bottom of the tiers of hung tobacco;

Fig. 2 is a vertical sectional view of the storage tank included in the general organization of Fig. 1 which contains the fire extinguishing fluid and includes means for forcing said fluid under pressure to the rotary sprinklers;

Fig. 3 is a detail sectional view of the spring loaded valve shown employed in Fig. 1 for providing an automatic discharge of the fire extinguishing fluid to the rotary sprinklers; and

Fig. 4 is a perspective view illustrating one of the nozzles on the arms of the rotary sprinklers.

Referring now more particularly to the draw-

ings, the fire extinguisher of the invention is shown in Fig. 1, by way of illustration only, as installed in a building structure B, which may be of any size, design or construction. In the present example, the structure B is illustrated as one of conventional type comprising walls 1 on the flooring or ground 3, and a roof 5 representing a tobacco curing barn of any desired size. The barn is provided with any suitable means for mounting a series of rods 8, sticks or poles in horizontal, generally parallel and spaced relation throughout the height of the barn except for a suitable spacing from the floor 3 and adjacent the roof 5. Prior to the mounting of the rods or sticks in the barn, bunches of green tobacco leaves 9 to be dried or cured are secured to the sticks in suspended relation along the lengths thereof. The tobacco carrying sticks as thus loaded with tobacco are mounted throughout the barn in a series of horizontal tiers so that the hung tobacco is arranged in a mass of closely spaced bunches of tobacco leaves to be subjected to the drying or curing process.

The heat for the curing or drying process is supplied by one or two or more heating devices (not shown) which are located in the space between the lowermost tiers of tobacco and the ground or flooring 3 of the barn. During the curing process, a barn temperature is maintained from 140° F. to 180° F., the latter being the final temperature used to dry the stem on the tobacco leaf. The heat for these high temperatures is usually supplied by heating devices using kerosene or fuel oil and these heating devices maintain a temperature of 800° F. to 1200° F. in order to produce the desired barn temperature. This barn temperature is maintained for a period of some one hundred twenty hours without interruption during which the barn and the tobacco being cured are subject to constant danger of loss by fire due to various causes such as, overheating of the heating devices, broken fuel lines, flooded oil burners, loose tobacco and tobacco sticks falling on hot parts of the heating devices, and spontaneous combustion as a result of overheated conditions in the tobacco barn after the tobacco has dried.

The fire extinguisher arrangement of the present invention guards against these various fire hazards in that it is adapted to operate automatically to extinguish quickly any fire within the barn, particularly in the mass of hung tobacco and also in the area of the heating devices which are usually the source of the fire. Inasmuch as such heating devices are usually oil fired, the arrangement preferably is such that the fire extinguishing fluid employed is especially suited for extinguishing oil fires and with such fluid sprayed under pressure in the most effective manner.

As shown in Fig. 1, a sprinkling or spraying device 10 in the form of a simple rotary jet sprinkler is provided below the mass of hung tobacco in the space between the flooring 3 of the barn and the lowermost tiers of tobacco sticks 8. The rotary sprinkler is mounted in any suitable manner in connection with a feed pipe 20 which preferably is embedded in the ground below the flooring 3 to minimize any fire hazard in this respect. The rotary sprinkler 10 preferably is of the type having a series of radial arms 11, carried by a rotatable head 12, and provided on their extremities with nozzles 13 having spraying perforations 14, as illustrated in Fig. 4. The rotary sprinkler, otherwise, is desirably one which is precision-built and with the head 12 mounted on stainless steel ball bearings to ensure rotation of the sprinkler head at high speed and to avoid any possibility of faulty operation as a result of rusting over any extended period in which the fire extinguisher may be idle before it is required to be used.

About the mass of hung tobacco, a similar rotary sprinkler 10' is mounted for operation in the space between the top of the barn and the uppermost tiers of tobacco. In the present example, the upper sprinkler 10' is shown mounted on a brace 16 adjacent the roof 5 of the barn and connected to a feed pipe 21 extending down along the side wall of the barn to a T-connection 25. The feed pipe 20 to the lower sprinkler 10 is also joined to said T-connection in communication with a supply pipe 27 from a storage tank 30 containing the fire extinguishing fluid 32, Fig. 2. In association with the piping to the sprinklers 10, 10', as described, similar conduits to the areas of the heating devices (not shown) are provided having suitable nozzles for spraying the oil burners of the heating devices with fire extinguishing fluid to smother and extinguish the same at the same time the rotary sprinklers are set into operation to extinguish any fire in and around the tobacco, thereby preventing any recurrence of fire after the extinguisher has been discharged.

The storage tank 30 for the fire extinguishing fluid may be of any selected design and, as shown in Fig. 2, comprises an elongate cylinder mounted on the outside of the bar in connection with the upper end of the supply pipe 27. The tank 30 is provided in a size sufficient to contain the required volume of the selected type of fire extinguishing fluid as necessary for the purposes intended depending on the size of the barn or other building and the areas therein to be protected. The fire extinguishing fluid may be either water, carbon tetrachloride, carbon dioxide or any other suitable liquid. In the present example, the fire extinguishing fluid 32 preferably is carbon tetrachloride and is maintained in readiness for operation of the fire extinguisher at all times under a pressure of about fifty pounds provided by a pressure container 35 such as a CO_2 bottle, compressed air cylinder, or the like. The CO_2 container 35 is suitably mounted on the tank 30 and provides, for example, a pressure of three hundred to five hundred pounds passing through the connection 36 to a reducing regulator 37 that reduces this pressure to the constant pressure of about fifty pounds which is directed through the outlet 38 to the interior of the tank 30 and onto the supply of carbon tetrachloride 32 within the tank. The tank apparatus otherwise includes a suitable safety valve 39 to prevent the development of any dangerous pressure within the tank.

The actuating means for the fire extinguisher is designed to set the same into operation automatically and, to this end, a spring loaded valve 40 is provided in the supply pipe line 27, Figs. 1 and 3. As shown in Fig. 3, the spring loaded valve comprises a generally T-shaped body having a fluid passage therethrough which includes a washer seat 41 that is normally closed by a disc 42 carried by an axially movable plunger 43 having suitable bushing elements and the like and a head 44 retaining one or more leaf springs 45 on the plunger. The leaf springs 45 are biased inwardly in the normal closed position of the valve by a push-pin 46 which in turn is forced inwardly by a lever 47 pivoted intermediate its ends by a

hinged connection to a pair of spaced ears 48 provided by an arm 49 on the valve body. The lower end of the lever 47, accordingly, engages the push-pin 46 to urge the same inwardly under force when the upper end of said lever 47 is moved outwardly.

The upper end of said lever 47 is connected to a fusible cable 50, wire, or the like, which extends horizontally through an opening in the adjacent wall of the barn. Fig. 1 and is secured to the opposite wall, for example, in tightly drawn tensioned condition to cause said lever 47 to maintain the valve 40 in its normal closed condition, as aforesaid. The fusible wire or cable 50 thus is arranged in the most appropriate position paralleling the tobacco carrying sticks 8 in the lower portion of the barn or in any other suitable manner throughout the barn in the most practical relation to the heating devices on the ground or flooring 3. The fusible wire or cable 50 may be of any suitable character and in the present example, is shown comprising a series of wires 51 joined by fusible links 52 which are adapted to melt and rupture when subjected to a predetermined temperature. In any installation, such a fusible cable or wire 50 is provided in accordance with the construction of the tobacco curing barn or other building in a manner whereby the cable extends throughout the various parts of the barn to meet any and all fire conditions.

In operation, it will be understood from the foregoing that when a fire occurs within the barn, the temperature, of course, rises to a point in which the excessive heat causes one or more of the fusible links 52 to melt and rupture, thereby breaking the cable 50 and releasing the same from its normal tensioned condition. The valve lever 47 connected to said cable, accordingly, is free to move to inoperative position, shown in broken lines in Fig. 3, thereby releasing the pressure on the push-pin 46 controlling the valve 40. This permits the inwardly biased leaf springs 45 to assume their untensioned condition, as represented in dotted lines, to pull the valve plunger 43 outwardly and thereby space the washer disc 42 from the seat 41 to allow the fire extinguishing fluid to pass through the valve 40, as indicated by the arrows in Fig. 3. As soon as the valve 40 is thus atomatically opened, the pressure from the CO_2 container 35 serves to force the carbon tetrachloride 32 or other fire extinguishing liquid within the tank 30 to flow swiftly through the supply pipe 27 to the feed pipes 20, 21, leading to the rotary sprinklers 10, 10', at the base and top of the barn, respectively, and to the auxiliary pipes leading to the heating devices to extinguish the burners therein as promptly as possible, as aforesaid.

The fire extinguishing liquid under pressure causes the rotary sprinklers 10, 10', to rotate simultaneously at high speed and thereby spray the fire extinguishing liquid in a dense mist over relatively large areas into and completely around the mass of hung tobacco. The action is such that the lower rotary sprinkler 10 sprays a spiraling mist upwardly and outwardly while the upper sprinkler 10' provides a spiraling mist downwardly and outwardly. Consequently the opposing dense mists of fire extinguishing fluid provide a compression effect on the mass of hung tobacco in a manner which quickly smothers and positively extinguishes in very little time any fire in the tobacco or otherwise within the barn.

After any such use of the fire extinguisher, the same may be readily prepared for further use simply by recharging the storage tank 30 and the pressure cylinder 35 and repairing the fusible cable 50 as required to provide the various parts in the relation shown in Fig. 1 in readiness for another fire extinguishing operation in a repetition of the foregoing described procedure.

It will be appreciated that various other arrangements may be employed in which other kinds of fire extinguishing fluids are supplied under pressure to the rotary sprinklers at the top and bottom of the barn, respectively. For example, the fire extinguisher may be operated at very little cost by the use of water as the extinguishing fluid which is forced to the rotary sprinklers under air pressure in the pressure cylinder 35 in a substantially equivalent arrangement operating in the same general manner.

Also, in any installation in a relatively large tobacco curing barn, for example, or other building in which it appears necessary or advisable to provide a greater volume of fire extinguishing fluid over larger areas, the rotary sprinklers may be installed in multiple at the top and base of the barn, as in the manner of opposing series of rotary sprinklers in cooperating relation.

While the invention has been described in detail with a specific example, such example is intended as an illustration only, inasmuch as it will be apparent that other modifications in the construction, arrangement and general combination of parts may be devised without departing from the spirit and scope of the invention. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, with all changes falling within the scope, meaning and range of equivalency of the claims intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A fire extinguisher for a tobacco curing barn or other building, said fire extinguisher comprising a rotary sprinkler positioned in the lower area of said building adapted to provide a mist of fire extinguishing fluid directed upwardly and outwardly, a cooperating rotary sprinkler positioned in the upper area of said building adapted to provide a mist of fire extinguishing fluid directed downwardly and outwardly, means for automatically supplying fire extinguishing fluid to said rotary sprinklers comprising a pipe connected to a supply of fire extinguishing fluid, a normally closed valve associated with said pipe and fire detecting means in said building associated with said valve and providing for opening of said valve in the event of fire.

2. A fire extinguisher for a tobacco curing barn or other building, said fire extinguisher comprising a rotary sprinkler positioned in the lower area of said building adapted to provide a mist of fire extinguishing fluid directed upwardly and outwardly, a cooperating rotary sprinkler positioned in the upper area of said building adapted to provide a mist of fire extinguishing fluid directed downwardly and outwardly, means for automatically supplying fire extinguishing fluid to said rotary sprinklers comprising a pipe connected to a supply of fire extinguishing fluid, a spring loaded valve associated with said pipe, and a fusible cable in said building connected to said spring loaded valve and maintaining the same normally in closed position.

3. A fire extinguisher for a tobacco curing barn or other building, said fire extinguisher comprising a rotary sprinkler positioned in the lower area of said building adapted to provide a mist of fire extinguishing fluid directed upwardly and outwardly, a cooperating rotary sprinkler positioned in the upper area of said building adapted to provide a mist of fire extinguishing fluid directed downwardly and outwardly, a tank containing fire extinguishing fluid to be supplied to said rotary sprinklers, a pressure container associated with said tank providing for flow of said fluid under pressure, a pipe connected to said tank and leading to said rotary sprinklers, a spring loaded valve associated with said pipe, and a fusible cable in said building connected to said spring loaded valve and maintaining the same normally in closed position.

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