APPLICATION FOR A STANDARD PATENT

I/We,

NUAI RE LIMITED

of

WESTERN INDUSTRIAL ESTATE
CAERPHILLY, MID.
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WALES
ENGLAND

hereby apply for the grant of a standard patent for an invention entitled:

A FIRE CURTAIN INSTALLATION.

which is described in the accompanying complete specification

Details of basic application(s):

<table>
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<th>Number of basic application</th>
<th>Name of Convention country in which basic application was filed</th>
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My/our address for service is care of GRIFFITH HACK & CO., Patent Attorneys, 601 St. Kilda Road, Melbourne 3004, Victoria, Australia.

DATED this 29th day of November 1989

NUAI RE LIMITED

GRIFFITH HACK & CO.

TO: The Commissioner of Patents.
Claim

1. A fire curtain installation comprising a curtain of flexible fire-proof material wound upon, and adapted to unwind under gravity from, a rotatable roller, a pneumatic cylinder which is nested within the roller and whose piston is coupled to the roller through a rope and pulley transmission which converts linear motion into rotary motion, a pneumatic valve for controlling the supply of pressurised air from a pressure air source to the pneumatic cylinder, the curtain being normally held in its retracted position by the supply of pressurised air, and control means, operable in response to the presence of fire, to operate the valve means to cut off the supply of pressurised air to the cylinder.
TO BE COMPLETED BY APPLICANT

Name of Applicant: NUAIRE LIMITED

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Australia.

Complete Specification for the invention entitled:
A FIRE CURTAIN INSTALLATION.

The following statement is a full description of this invention including the best method of performing it known to me:-
A FIRE CURTAIN INSTALLATION

This invention relates to a fire curtain installation; a fire curtain installation is designed to restrict the spread of a fire in a large open planned building and comprises of curtain of flexible fire-proof material wound upon, and adapted to unwind under gravity from, a rotatable roller. It is known to provide an electric motor to rotate the roller to wind up the curtain thereon with a complex electrical control circuit for controlling the motor. It has also been proposed to provided a pneumatic motor, i.e. a piston-in-cylinder arrangement, whose piston is coupled to the roller to wind up the curtain on the roller. In this case there must be provided some control system to control the supply of air to the cylinder.

It is an object of this invention to provided a relatively simple and improved fire curtain installation.

According to this invention, there is provided a fire curtain installation comprising a curtain of flexible fire-proof material wound upon, and adapted to unwind under gravity from, a rotatable roller, a pneumatic cylinder which is nested within the roller and whose piston is coupled to the roller via a rope and pulley transmission so that movement of the piston in relation to the cylinder causes the roller to rotate, a pneumatic valve for
controlling the supply of pressurised air from a pressurised air source to the pneumatic cylinder, the curtain being normally held in its retracted position by the supply of pressurised air, and control means, operable in response to the presence of fire, to operate the valve means to cut off the supply of pressurised air to the cylinder.

The term "rope" as used in the specification or claims, is to be understood to cover wire.

Preferably the valve means is operated, in the presence of smoke or fire, to exhaust pressurised air from the cylinder.

Preferably the cylinder is fixed to the roller and the transmission comprises a first pulley which is carried at the end of the piston, which is rotatable, and around which a rope extends, and a second pulley which is fixed and which is coaxial with the roller, one end of the rope being secured to the roller and the other being wound upon the second pulley, the supply of pressurised air to the cylinder causing the piston to be retracted into the cylinder and the first pulley to be moved away from the second pulley there by unwinding the rope from the fixed pulley and rotating the roller.

Preferably, the first pulley is rotatable about an axis at right angles to that of the roller and the rope extends over a guide pulley in its path between the first pulley and the second pulley, the guide pulley being supported by the roller and being mounted for
rotation about an axis at right angles to the axes of the first and second pulleys.

In use, when the curtain is in its operative position (i.e. when it is unwound from the roller), and the valve is operated to connect the pressurised air source to the cylinder, the piston of the cylinder is retracted into the cylinder under the influence of the pressurised air so as to rotate the roller and thereby retract the curtain. As long as this supply of pressurised air to the cylinder is maintained, the curtain will remain retracted.

In the event the control means operates the valve means and exhausts the pressurised air from the cylinder, the curtain unwinds under gravity, thereby moving the piston out of the cylinder.

The pneumatic cylinder may be provided with a cushioning device at each end.

Preferably the control means comprises a solenoid coupled to the valve means and operable when energised to move the valve means to a position in which pressurised air is supplied to the pneumatic cylinder, means for interrupting the supply of power to the solenoid in the presence of fire, and spring means for urging the valve means to a position in which no pressurised air is supplied to the cylinder and pressurised air is exhausted from the cylinder to atmosphere.
A fire curtain installation in accordance with this invention will now be described, by way of example only, with reference to the accompanying drawings of which:-

Figure 1 is a schematic view of the fire curtain installation; and

Figure 2 is a pneumatic and electrical circuit diagram.

Referring to Figure 1, a fire curtain 1 is weighted at its bottom end by a T-bar 2 and is wound up on a rotatable roller 3. The curtain 1 extends through a slot in a false ceiling (not shown) in the building in which it is installed. The piston 4 of a pneumatic cylinder 5 is coupled to the rotatable roller 3 via a steel wire and pulley mechanism. The cylinder 5 is fixed to one end plate 6 of the roller 3 and extends within and coaxially with the roller 3. The wire and pulley mechanism firstly comprises a rotatable pulley 7 carried at the end of the piston 4 which, on supply of pressurised air to the cylinder 5, is retracted into the cylinder 5. A steel wire 8 extends around the rotatable pulley 7 and is secured at one end to the other end plate 9 of the rotatable roller 3. The rotatable roller 3 is itself mounted for rotation in relation to a fixed support 10 which consists of a bar with two depending limbs 11 and 12. At their ends the limbs 11 and 12 carry respectively stub shafts 13 and 14 which extend through the end plates 6 and 9.
respectively towards each other, at its inner end, the shaft 14 carries a fixed pulley 15 which is parallel to but not fixed to the end plate 9. The end plate 9 carries pulley 16 rotatable about an axis parallel to the end plate 9 and at right angles to the axis of the roller 3. The steel wire 8 extends around the rotatable pulleys 7 and 16 (pulley 16 acts as a guide) and around the fixed pulley 15.

The roller as a whole is rotatable about the stub shafts 13 and 14 which have bearings. On supply of pressurised air to the cylinder 5 the piston 4 is drawn in to the cylinder 5 causing the steel rope 8 to be unwound from the fixed pulley 15 and rotation of the roller 3 in the clockwise direction (as seen in figure 1) about stub shafts 13 and 14 so that the curtain 1 is wound up on the roller 3. The movement of the steel wire 8 rotates the rotatable pulleys 7 and 16. Assuming the curtain 1 is fully wound up on to the roller 3 removal of the supply of pressurised air to the cylinder 5 and exhaustion of any pressurised air in that cylinder causes the curtain 1 to fall under the action of the T-bar 2. This rotates the roller 3 in the anti-clockwise direction (as seen in figure 1) about the stub shafts 13 and 14 so that the steel wire 8 is wound up on to the fixed pulley 15. During this action the piston 4 is drawn out of the cylinder 5 and the rotatable pulleys 7 and 16 are rotated about their axes by the motion of the steel wire 8. An air supply line is
connected to the cylinder 5 which is cushioned at each end, in known manner, and has its own air exhaust (not shown).

Referring now to Figure 2, the cylinder 5 is shown as having adjustable unidirectional flow control restrictors in the supply line 19 which control the rate of ascent or descent of the fire curtain 1. A pressurised air source 20 (which may be a large reservoir to which a compressor is connected) is connected via a valve generally indicated at 21 to the supply line 19 of the pneumatic cylinder 5.

The pneumatic valve 21 is a two position device urged to the left (the position shown) by a spring 22 and urged to the right by a solenoid 23 when that solenoid 23 is energised. In the right position, the pressurised air source 20 is connected through the valve 21 to the air supply line 19.

When the valve 21 moves to the left on de-energisation of the solenoid 23, the pressurised air source 20 is connected to a blind passage 24 in the valve 21 and the air supply line 19 is connected to exhaust via an adjustable restrictor 25.

The solenoid 23 is normally energised from a 24V DC supply source but is connected via an alarm switch and a test switch in series to that supply. Whenever an alarm condition, e.g. fire or smoke is detected, or the test switch is operated, the solenoid 23 is de-energised and the pneumatic cylinder 5 is exhausted to atmosphere.
via the restrictor 25. As a result the fire curtain 1 will descend at a controlled rate under its own weight drawing the piston 4 out the cylinder 5 through the steel wire 8 and pulley mechanism; will depend on the adjustment of the restrictor 25.

The second adjustable flow restrictor 26 filled in the air supply line 19 restricts the flow of air into the cylinder 5. The degree of adjustment of that restrictor would control the rate of ascent of the fire curtain on the supply of pressurised air to the pneumatic cylinder.

The control and drive mechanism for the fire curtain 1 illustrated is relatively inexpensive and simple.
CLAIMS
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A fire curtain installation comprising a curtain of flexible fire-proof material wound upon, and adapted to unwind under gravity from, a rotatable roller, a pneumatic cylinder which is nested within the roller and whose piston is coupled to the roller through a rope and pulley transmission which converts linear motion into rotary motion, a pneumatic valve for controlling the supply of pressurised air from a pressure air source to the pneumatic cylinder, the curtain being normally held in its retracted position by the supply of pressurised air, and control means, operable in response to the presence of fire, to operate the valve means to cut off the supply of pressurised air to the cylinder.

2. A fire curtain installation according to claim 1 wherein the valve means is operated, in the presence of fire, to exhaust pressurised air from the cylinder.

3. A fire curtain installation according to claim 1 or 2 wherein the cylinder is fixed to the roller and the transmission comprises a first pulley which is carried at the end of the piston, which is rotatable, and around which a rope extends, and a second pulley which is fixed and which is coaxial with the roller, one end of the rope being secured to the roller and the other being wound upon the second pulley, the supply of pressurised air to the cylinder causing the
piston to be retracted into the cylinder and the first pulley to be
moved away from the second pulley thereby unwinding the rope from the
fixed pulley and rotating the roller.

4. A fire curtain according to claim 3 wherein the first pulley
is rotatable about an axis at right angles to that of the roller and
the rope extends over a guide pulley in its path between the first
pulley and the second pulley, the guide pulley being supported by the
roller and being mounted for rotation about an axis at right angles
to the axes of the first and second pulleys.

5. A fire curtain according to any of claims 1 to 4 wherein the
pneumatic cylinder is provided with a cushioning device at each end.

6. A fire curtain according to any of claims 1 to 5 wherein the
control means comprises a solenoid coupled to the valve means and
operable when energised to move the valve means to a position in
which pressurised air is supplied to the pneumatic cylinder, means
for interrupting the supply of power to the solenoid in the presence
of fire, and spring means for urging the valve means to a position in
which no pressurised air is supplied to the cylinder and pressurised
air is exhausted from the cylinder to atmosphere.

7. A fire curtain installation substantially as hereinbefore
described with reference to the accompanying drawings.

DATED THIS 29TH DAY OF NOVEMBER 1989

NUAIRE LIMITED
By its Patent Attorneys:

GRIFFITH HACK & CO.
Fellows Institute of Patent
Attorneys of Australia.