The action of steam as an interceptor of the air supply, is however, of much more importance than its cooling power, and as such water rarely ever, in ordinary cases never, acts. This is easily and forcibly explained Suppose a fire in a room; steam is turned on, and in two or three minutes the whole space is filled with steam of atmospheric pressure, the supply, however, continues, and if the pressure in the room is not to augment, it must issue through some opening or crevices, and if this is the case it will be obvious that no air can have ingress unless forced in as by a blast-pipe. This is, however, an extreme case, for it is known that even before a room is completely filled with steam of the same pressure as the atmosphere, the air becomes so pregnant with moisture that it ceases to support combustion. There would be no danger of the steam-pressure becoming excessive in the room of a building, because buildings are always of such a nature as to allow of sufficient escape for its equalisation, or of keeping it at a moderate pressure; and the idea that walls would be blown in and roofs lifted off, is perfectly ridiculous. Nor is the danger of converting a room into a blast-pipe of any consequence, because it will be seen that the steam would have to blow out of one or more openings, while there was one or more opposite, at which air would enter through the impulse created by the steam flowing in a body and in one direction A comparatively small quantity of moisture would, therefore, suffice to prevent access of air, when we consider that one part of water occupies 1,600 times its original space if converted into steam of a pressure equal to that of the atmosphere. It is well known also that fires only attain their full power when the buildings or particular rooms are entered through doors which give increased facilities for the admission of air. This danger is entirely avoided with steam, because no one has occasion to enter a compartment in which there is a fire, if it has been provided with steampipes. From the same fact, the danger associated with carrying water, either in vessel or hose and jets, to burning apartments is entirely avoided. One important fact must not be omitted. Those acquainted with conflagrations are well aware of the very destructive and dangerous action which water has upon cast iron, which now enters so largely in the construction of buildings. Sometimes a heavy ceiling or roof is solely dependent on one or more cast-iron columns, which are only too liable to become very hot in a fire, and if highly-heated cast-iron is struck by a jet of water, either accidentally or intentionally, it is well known that it flies like glass, the more so if under a strain. No such consequences would result from the use of steam, on account of its gradual action. Steam also has the advantage of operating upon all kinds of combustibles; water, it is well known, has no power on hydro-carbons, especially fluids, such as oil, and the only remedy against these is the interception of the air supply. This steam will accomplish In a paper published in the *British Architect*, and subsequently discussed by the Scientific and Mechanical Society, Manchester, the advantages of steam over water are thus summarised by Mr. A. Hildebrandt: 1. Steam affords the opportunity of all arrangements for its application being made beforehand, and thus ready to operate without a moment's delay 2. Its use does not give increased facilities for the access of air, as is the case with water when it has to be carried in vessels or hose and get to the apartment where the fire is, thus necessitating opening doors and other air inlets. 3. Its action is certain and unfailing in all cases wherever it is possible to apply it, since it operates upon any kind of combustible with effect. 4. It does not in its successful application destroy property contiguous to the fire. 5. It entails no danger to life and limb of the operator as when applying water. 6. It does not require pumps or other appliances and machinery to convey it where it is required. 7. If proper provision for its use has once been made it does not require any further human labour.

As regards the condition of the steam to be used, theory points to high-pressure steam as the most efficient, although it contains rather more heat in the same weight of water than steam of lower pressure, for which reason it has been advocated to reduce it by means of a reducing valve We, however, should deprecate the use of such an appliance if the object was to make steam suitable for the purpose under consideration, because steam so treated becomes slightly superheated. We should, however, not object to reduced steam being used if it was nearest at hand in the case of fire. The efficiency of steam as a fire-extinguisher proved, an apparatus which in case of fire should, without human intervention, admit the same into the apartment where it occurred, must unquestionably be an immense boon both to proprietors and insurance offices; and this Mr. Sanderson has succeeded in supplying in his self-acting apparatus which we illustrate in fig. 1. It will be seen at a glance that its action depends on the expansion of bodies by heat and on electricity. Fig. 1 is an apparatus shown complete in itself for the sake of illustration. The wire C1, of an electric circuit is inserted into the bulb of a thermometer T, fixed on the ceiling C, of a room, and the other end, C11, of the same into the top of the thermometer tube, projecting far enough to correspond to a certain temperature to which it is desired to adjust the same, and which should be one that is not reached under ordinary circumstances, but quickly produced by a fire. If the mercury rises to touch the wire, C11, the circuit is complete, the galvanic battery B, supplies power to the electro-magnet to attract its armature, A, which is one arm of a lever holding at its other extremity the pin of a faller weight, F, which is thus liberated, and falls upon the lever, L, causing the other end of the same to rise, a pin on the rim, R, of the valve-wheel, which is being held by the lever, L, escapes from its hold, and revolves in the direction in which it is drawn by a weight, W, thus opening the valve V, in the pipe P, branching off in each room from the main pipe, M, and thus admits steam into the room until the valve is closed again, which may be done at pleasure if desired.

It is obvious that the number of thermometers in the same circuit can be multiplied *ad libitum*, care being taken that each may form a circuit independent of any other. It will be seen, therefore, that one battery is sufficient for any number of thermometers in one room, and for any number of rooms.

In figs. 2 and 3 we show plan and longitudinal section of a mill-room, to which the apparatus is applied. The thermometers, T, are fixed from 10 to 15 inches apart, the aperture, O, of the branch-pipe, for the issue of the steam being in the centre, and near the top of the room, with a deflecting-plate, D, below, to avoid a direct rush of steam on any one standing under the opening at the time of discharge. It is obvious, however, that no general rule can be laid down for these particulars, but that the number of thermometers, the position of the opening, O, &c, will vary with circumstances; the latter should always be central, between any possible openings or escapes for air or steam. Our arrangement shows an extra valve, V, between the boiler and the main steam-pipe, worked by the same circuit, but it has its own apparatus, and is so connected as to be actuated every time in addition to the valve in the room in which contact has been made, in order to admit steam to the branch valves A boiler is shown dotted, simply to remind the reader of the necessity of one being in or near the premises. The main steam-pipe is shown, 6-inch hose, the branch-pipe 4-inch. A steam-whistle is fitted to the former, in any convenient place, so as to give an alarm which is especially useful at night and other times when the hands are away from mills, and to tell the watchman to make more fire, but under the boiler, so as to generate more steam

The idea of the apparatus is at once simple and beautiful, and as for its liability to get out of order we do not think it is more so, if as much, as an ordinary fire-engine. Should contact be made accidentally, for instance, through lightning, the valve can at once be closed by hand if it should happen during the time that the place were attended; but even if this were not the case, not much damage could be done, the damping of the place and the goods it contained could not possibly be a serious thing.

The only thing which obstructs the adoption of this apparatus in cotton-mills and other concerns is, we imagine, the scepticism of millowners in the efficiency of steam for the purpose of extinguishing fires, but the experiments which led the inventor to patent the apparatus have so satisfied him and the firm in which he is a partner, that they are now anxiously waiting for the offer of mill-rooms to be placed at their disposal to try both steam and the apparatus, at their cost and risk, and to prove its utility practically, and on a large scale. We trust this opportunity for trying an appliance which promises to be so very useful, and likely to save a large amount of valuable property, will not long be wanting. We commend it warmly to the attention of insurance offices as likely to prove of considerable value to them. We shall watch the trials with interest, although instances of success with steam are, as we have said, not wanting, while that there are other people besides the inventor and makers of this apparatus, who have great faith in steam, is shown by the fact that there are instances where