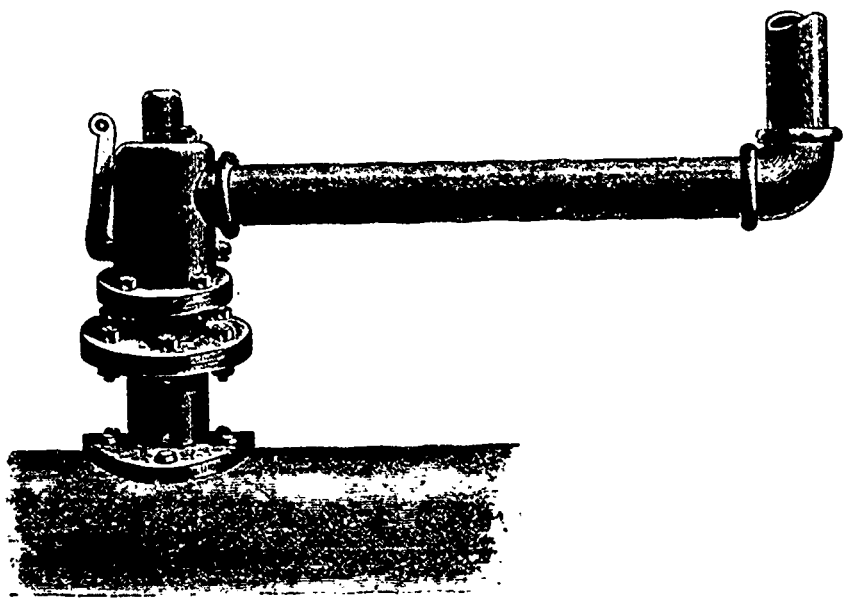
DANGEROUS POP-PALVES.

The pop-valve is coming into pretty general use on stationary boilers, the chief objection to it, we believe, being its expense. It responds quickly when the steam pressure exceeds the working limit, and, being direct acting, it has no levers that can get cramped, and the only way it can get fast is by the valve adhering to its seat, which is not likely to happen if it receives proper attention. Moreover, the pop-valve can be locked up, so that irresponsible persons cannot tamper with it or change the pressure at which it is set.

There is one feature about the pop-valve, however, which may make it dangerous. In many cases a waste-pipe is attached to the escape opening in the manner shown in the cut, the horizontal pipe being, say, four feet long, and the vertical pipe long enough to direct the outflow of steam upward, or perhaps long enough to pass through the roof so as to discharge out of doors. Usually no adequate support is provided for the waste-pipes that are put on in this manner, such support as there may be being intended only to relieve the valve-casing of the weight of the pipe. Now, when the valve blows off, the escaping steam rushes upward through the escape pipe, and creates a downward reaction that brings a severe strain on the outside casing of the valve. Suppose, for example, that the waste-pipe is four inches in diameter, and that the pressure at which the boiler blows off is 100 pounds per square inch. The area of a four-inch pipe is 12½ inches, and a reactionary pressure of 100 pounds per square inch acting on this area would give a total downward reaction of 1,250 pounds. This, acting at the end of a four-foot lever (*i.e.*, the waste-pipe), would bring an enormous strain on the casting that forms the outside of the valve; and it should be borne in mind that this casting is all that holds the valve together, so that if the casting should fail under the strain, the entire valve would be blown from the boiler, and in a few moments the entire contents of the boiler would be blown out. The result would probably be that the boiler would be burned before the fire could be drawn, to say nothing of the likelihood of scalding employes. Several accidents of this kind have come to our attention recently, and we do not doubt that others will continue to happen unless this arrangement of the waste-pipe is discarded. To appreciate the danger fully, one only needs to be on the top of a boiler arranged in this way when the valve blows off.



A Dangerous Arrangement.

It might be objected that the full head of steam is not realized at the end of the waste-pipe, and that the strain on the casting would therefore be materially less than is indicated above. In reply to this we may say that even if the reactionary pressure is but 50 pounds to the square inch, the total reaction in a four inch pipe will be 625 pounds, and this, if the pipe is four feet long, will bring a bending moment on the casting of the valve 4×625 = 2,500 foot pounds, which is quite sufficient to endanger the casting if there should happen to be a flaw in it, and to bring on the bolts that fasten the casting to the neck below, a strain that is greater than they can stand with safety.

If this form of attachment is to be used at all, the outer end of the pipe should have a substantial support, capable of safely bearing a weight of a ton or so; and some method of draining the pipe should be provided, in order that it may not fill with water and set back into the valve. The valve is provided with a drip opening, it is true, but it is well to incline the waste-pipe downward and put an opening in it near the elbow (at the right hand end in the cut), in order that any water in it may pass off freely without running back through the valve-casing.

We advise that the waste-pipe from safety-valves, if any be used, should be a simple, straight piece of pipe, without elbows and dipping slightly downward, so that water may run out freely We also advise that the waste pipe should open *in the boiler room*, unless the available space is so small as to make this impracticable. We have known of a number of accidents that were caused by the freezing up of the outer ends of waste pipes discharging out of doors. If the boiler room is small, however, and the valve is large, it may be dangerous to blow off in the room, for pop-valves blow so suddenly that there is danger of the fireman being scalded, unless there is a large free space to blow into. Numerous fatal accidents have been caused this way.

Setting a pop valve under working pressure is always a dangerous proceeding. A safe way to set such a valve is to adjust it when the steam pressure is far below the blowing off point, and test it by bringing the steam pressure up to the point at which it is desired to blow. A further adjustment is made the next time the pressure is down, and after several attempts are made in this way, the valve may be brought to the desired blowing off point. This process is a long and tedious one, and the same degree of safety and accuracy may more quickly be attained by filling the boiler with hot water and adjust the valve under water pressure, which may be done without danger. *The Locomotive.*

THE CANADIAN ELECTRICAL ASSOCIATION.

The National Electric Light Association, since its inception, has been doing good work for the electrical interests of the United States. Although at the beginning of its existence it was thought by some that it was directly opposed to the business interest of the parent companies, yet its work has conclusively shown on the contrary that it was of mutual benefit all round. Although central station interests received the larger part of its attention, the exchange of opinion and the suggestions offered, proved to be beneficial to all concerned. Our Canadian friends, through the information obtained from the meeting of the National Association in a Canadian city, at its last session, have formed the Canadian Electrical Association, which will follow in the path of its contemporary and endeavor to advance the electrical interests of the Dominion in the same extensive and substantial way as has been done in the United States Owing to the short time that electricity has been in use for so many diversified purposes, the increased number of applications that are constantly being made show that it has a field, wholly its own, in which no effort will be necessary to expel any force that may now have a strong footing, but rather it will work in conjunction with those already established for the increased benefit of both and the greater usefulness to mankind in the development of natural resources. If our Canadian friends will go at the work with the same degree of energy as was shown by the National Association, the improvement of the rich land to the north will follow with surprising rapidity. *Stationary Engineer.*

The commutator is a device for causing the current which flows from the armature alternately in opposite directions to flow into the circuit in one and the same direction. It is built on the armature shaft and consists of a metallic cylinder which is divided into as many segments in pairs as there are electro-magnets or armature coils. The ends of the wires from the electro-magnet or magnets or the coils used in building up the armature are connected with these segments or commutators. The current is taken off from the commutator by means of collecting brushes that rest thereon as the commutator is revolved.