

what is commonly known as "hammering" which is the curse to so many systems.

The reader will easily see the analogy between the openings at "B," "B," "B," and the connections in a steam system, which will be taken off at similar intervals, to supply the radiators and will also understand that each succeeding connection will reduce the pressure beyond that point, in the manner already described, and he will also understand the necessity of so regulating the flow of the steam, having regard to both resistance due to friction, small piping, changes in direction of current, etc., and condensation, as will provide for a minimum difference in pressure, and consequently in the water level, between the boiler and the distant portions of the system.

It will be obvious, too, that it is necessary, for the reasons already given, that the steam main should be kept up to the highest possible level, so as to be beyond the reach of this natural elevation of the water level in the returns, and in ordinary cases this is not a difficult matter.

It sometimes happens, however, that the steam mains must run a considerable distance before any connections are taken off, and, under other circumstances to supply very distant radiators in a long building, and while regard must be had in every instance to the size of the main (and this feature will be dealt with at greater length in succeeding articles), it is at the same time possible to keep the steam main above a predetermined level, no matter what this length may be, and at the same time make provision for its relief and proper drainage in the direction in which the steam is travelling.

In Fig. 3, we indicate how this is done.

It must be borne in mind that unless in the case of very short runs, as for example branches to radiators or risers, that the steam main must fall in the direction in which the steam travels, for the reason that, unless pipes are very large, the tendency of the rapidly moving steam is to carry back with it the condensation, which would be travelling in an opposite direction and eventually fill portions of the pipe with water, when the steam, in passing through the latter, will be rapidly condensed, creating a vacuum and drawing the water together with such a force as to result in "hammering" or "pounding" already referred to, so that it is necessary that the two bodies, *viz.*, steam and water should work in harmony, instead of coming into conflict, if a noiseless and effective heating apparatus is to be provided.

In Fig. 3, we show the steam main carried from the boiler to the point "A," which presumably will be a considerable distance from the former, and which is also supposed to be the lowest point at which the main may touch, having regard to the danger of its becoming flooded.

At this point we may rise again as high as possible,

and continue to point "B," where the main may rise again if necessary, and so on with constant repetition.

It will be noted that whenever a low point in the system is reached, a "drip" is taken from it to the return main, and this drip connection will effectually rid the

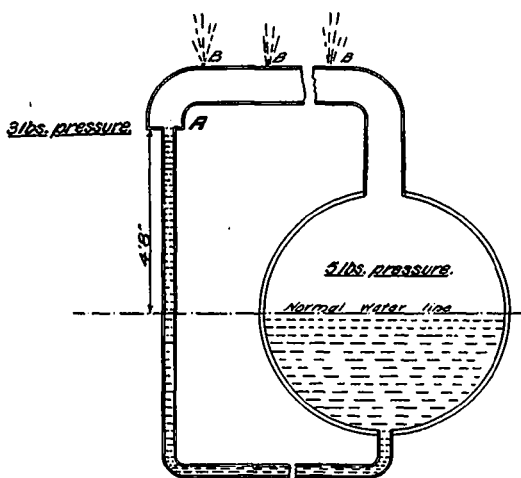


Fig. 2—SHOWING THE EQUALIZATION OF PRESSURE IN ALL DIRECTIONS, THE OPENING AT "B," "B," "B," BEING ANALOGOUS TO THE CONNECTIONS IN A STEAM HEATING SYSTEM WHICH SUPPLY THE RADIATORS.

main of all condensation, not only that produced within itself, but also that resulting from the radiators connected to the risers running up from it, so that if the steam main is of sufficient diameter, having regard to the probable amount of condensation which will result from the surface connected to it, the difference in pressure between the boiler and the distant ends may be so reduced as to effectually prevent any disturbance of the steam circulation from this cause.

An erroneous opinion is sometimes expressed that the Swinging Check Valve, shown in the return main near the boiler, will effectually prevent the water from backing up through the reliefs into the steam main. But this is not the case, for the reason that while the check valve will undoubtedly prevent the water from escaping back through the return from the boiler, it will refuse to open and permit the entrance of condensation to the boiler from the heating system, so long as the pressure in the latter is less than that in the boiler, with the result that the check valve will remain closed until the condensation fills the drip pipes to a sufficient height above the boiler water level, to overcome the difference in pressure existing in the system.

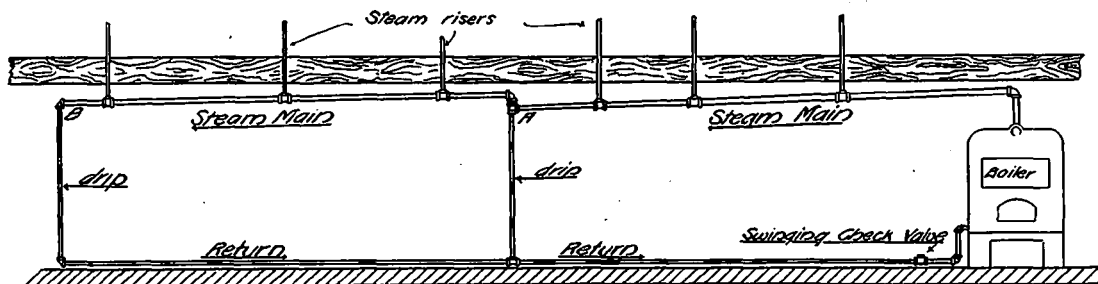


Fig. 3—SHOWING THE GRADUAL PITCH OF THE STEAM MAIN IN DIRECTION IN WHICH THE STEAM TRAVELS, THUS OVERCOMING THE TENDENCY OF RAPIDLY MOVING STEAM TO CARRY BACK THE CONDENSATION BY RIDDING THE MAIN OF THIS ELEMENT AT EVERY LOW POINT THROUGH A "DRIP" CONNECTING WITH THE RETURN MAIN.