



THE AMERICAN TRICYCLE SKATE.

with it and its gases than is chemically required for combustion. Ordinarily twice the amount of air is required. In controlled combustion the diminished density of the air produced as above described, together with its heated and subdivided condition as it enters the combustion chamber, permits of practically only twelve pounds of air per pound of fuel being used.

REPORTER—Why did you think of using a fan to exhaust furnace air and thus produce draught.

MR. MALLETT—When you consider that air is like a rope in this respect, that it can be better pulled than pushed, and that in inducing draught instead of blast by a pressure fan you are simulating the actual effect of a chimney without a loss, you must admit that the advantage of mechanical draught is great. While chimney draught causes a loss of fuel of from twenty-five or thirty-five per cent. draught by a flue fan can be produced at from three to four per cent of fuel expenditure.

REPORTER—Do not the heated gases destroy the fan in time?

MR. MALLETT—Not only would heated gases effect the fan, but their expanded volume would necessitate a fan of impracticable size. It was a difficult problem to devise a means of rapidly cooling furnace gases. Reflecting that dry air of even a very high temperature did not radiate heat to our own bodies in a Turkish bath as perceptibly as moistened air of a very much lower temperature in a Russian bath, it occurred to me that if these escaping gases could in a practical way be saturated with moisture and be thus kept at their dew point their radiating property would be so increased as to cause them to

be rapidly cooled when in contact with a cooler substance. The above sketch illustrates how this is done in practice. The square case to the right of the boiler is packed with iron pipe, forming a continuous passage for the circulation of water that enters the pipes at the bottom of the case, passing out from the uppermost series of pipes. The ordinary feed water of the boiler is, by means of a pump, forced into the lower series of pipes. The heated furnace gases enter the apparatus called an "athermous superheater" (athermous meaning opaque to radiant heat) at the top, pass in a downward direction through the stack pipes and then enter the exhaust fan. A spray of water, as shown, in quite an insignificant quantity, saturates the gases with moisture. This water comes from the uppermost pipes of the superheater, and, before escaping through the spray, has a boiling temperature. Although the gases entering the superheater may have a temperature of 1,000 degrees they will be cooled over 800 degrees during their transit. It is found that even with a very rapid rate of combustion and boiler evaporation all the feed water of the boiler will not only be heated to the same temperature as the water within the boiler, but that it will, in part, be converted into steam. In order to utilize this steam and not allow it to enter the boiler together with the feed water, a "separator" is attached to the superheater, which causes the superheated water to feed the boiler while the produced steam enters the steam space of the boiler; the products of combustion thus leave the furnace, not only in a perfectly invisible condition even when soft coal or wood is burned, but their temperature is reduced to the lowest possible limit.—*New York Herald.*