areas of circles will show that a 16-inch piston is We see then that under the conditions needed. named, in order to obtain 117 horse-power, we shall need an engine with a piston 16 inches in diameter, a stroke of 48 inches, a mean effective pressure of 40 pounds, and a speed of 60 revolutions per minute.

STEEL CHIMNEYS.

A correspondent of the Boston Fournal of Commerce says that ordinary brick chimneys are built to withstand a pressure of 50 lbs. per square foot upon their vertical sectional area. Calculating in a round chimney, only one-half this area is affected. With a greater pressure than this they are liable to crush on the leeward side and fall. Plate-iron or steel chimneys, erected upon foundations to which they are bolted through and through, have a resistance equal to four times as much as this, besides being infinitely superior as lightning conductors, and not being destroyed by the changes of temperature. They have better draft, for the simple reason that they are tight. Brick chimneys are not tight; they are like sieves, through which the wind blows. It is an odd thing in this day of progress, called the steel age, we should have such an unmechanical' thing as a chimney built, of bricks, when a continuous shell of steel can be produced for less money, which has a tensile strength of 60,000 pounds per square inch, distributed in the most economical manner to resist the force to be met with; the other simply a pile of little pieces of baked mud, without cement of any kind, as the changing temperatures of brick chimneys have destroyed the cement or mortar in the structure, and it is not to be depended on in the least.

STOVES.

In Canada the use of stoves seems to date as far back as 1737, and these Canadian articles are said to have been of considerably better quality than those made in the United States by Franklin, a few years afterwards. "But cooking and heating stoves in their comparative perfection," says Hardware, "are a matter of the last fifty years. To those who can go back to that time, the expedients by which our grandmothers brought their edibles to such a state that they were even digestible would be a marvel to those who never had the fortune to have the experience of genuine camp life. The tin-baker and the bake-kettle have passed away, and through many evolutions the modern range, with hot water attachments and the folding gas stove, have left little to be desired." The stove is an invention, however, of antiquity, traces of it having been found in the historical annals of China and Japan and fragments unmistakably pointing to such an article were found in the ruins of Pompeii.

Large, clumsy stoves were made at an early day in Holland, Germany and England, and to this day in those countries the same forms and styles to a considerable extent are used. In Italy, at the present time, in the small towns, an iron box resting on the ground, with side handles and rude holes cut for draught, is used. In some cases even iron is not employed, but in its place terra cotta and stone are substituted. The American stove dates back to 1742, and credit for it is due to the busy brain of Franklin. It was then the open front, or a departure from the ordi nary fire-places. Franklin was urged by his friends to get patents, which he could easily have done; but he considered it his duty to the world to give it the benefit

of his invention without hindrance. "The Franklin" stove was soon introduced into England, and everywhere it is known to this day. It held sway long into the present generation, and then improvements and new inventions rapidly followed one another, beginning with the ordinary air-tight stove, down through every kind of draught, all sorts of dampers; heating stoves in which the fire would not go out, all kinds of gas stoves, and at last electric-heating stoves.

THE SIREN.

The siren is one of the best fog signals, as its penetrating, though rather disagreeable note, can be heard at an enormous distance. As they are only made, however, by one firm in the world, their construction is not generally known, and an account will perhaps be interesting. It is a simple enough instrument, says the Marine Review, and consists of two superposed discs, with a certain and corresponding number of holes. One disc is stationary, the other revolves, while at the same time air or steam is forced through the holes. When these are opposite each other, the steam will pass; when not opposite, the passage of the steam is stopped. Hence, when one of the discs revolves, the steam passes in a series of puffs, and if these puffs succeed each other with sufficient frequency a note is produced, rising in pitch with the rapidity of revolution, and increasing in power with the pressure of the steam. The discs may be revolved by a small steam engine, which also opens and closes a valve to allow for the passage of the steam, and this gives the sound which is the siren's characteristic, for a siren fog signal does not sound continuously, but gives a certain number of blasts of a definite length each minute. The steam is supplied by a boiler both for the engine and the siren, and, to avoid possible breakdowns, the boilers, engines, and sirens are always in duplicate. The steam pressure is ordinarily about 50 pounds, and the sound can be heard from ten to fifteen miles, and occasionally much farther, depending on the weather. Another form of siren is the self acting instrument, which is widely used on steamers. The discs are revolved by the steam itself, and the blasts are given by merely opening the valve by hand. The speed of revolution of the discs is automatically regulated by a centrifugal brake. ----.

AUTOMATIC FARE RECEIVER.

Some of our street railway companies will perhaps be interested to know that an instrument has lately been invented for automatically receiving fares and for giving out change. There is an inclined tube having a slot in the end for the reception of money, says the Age of Steel. This tube is attached to a perpendicular rack at the top, so that a dime, quarter, fifty cents or a dollar will stop at different stations in the rack opposite to a little drawer with four of them facing the said rack, one above the other., These stations are connected at their back ends, with six tubes filled with nickels and quarters, so that when a dollar is dropped in the inclined tube, the exact change will be returned by simply pushing a knob that is attached to a 2x6-inch plate with fingers on it, situated so as to enter the rack in front through holes; it thus pushes one of the little drawers and gives back the exact change. The finger presses on the money, which causes the drawer to slide, back and cuts off the proper