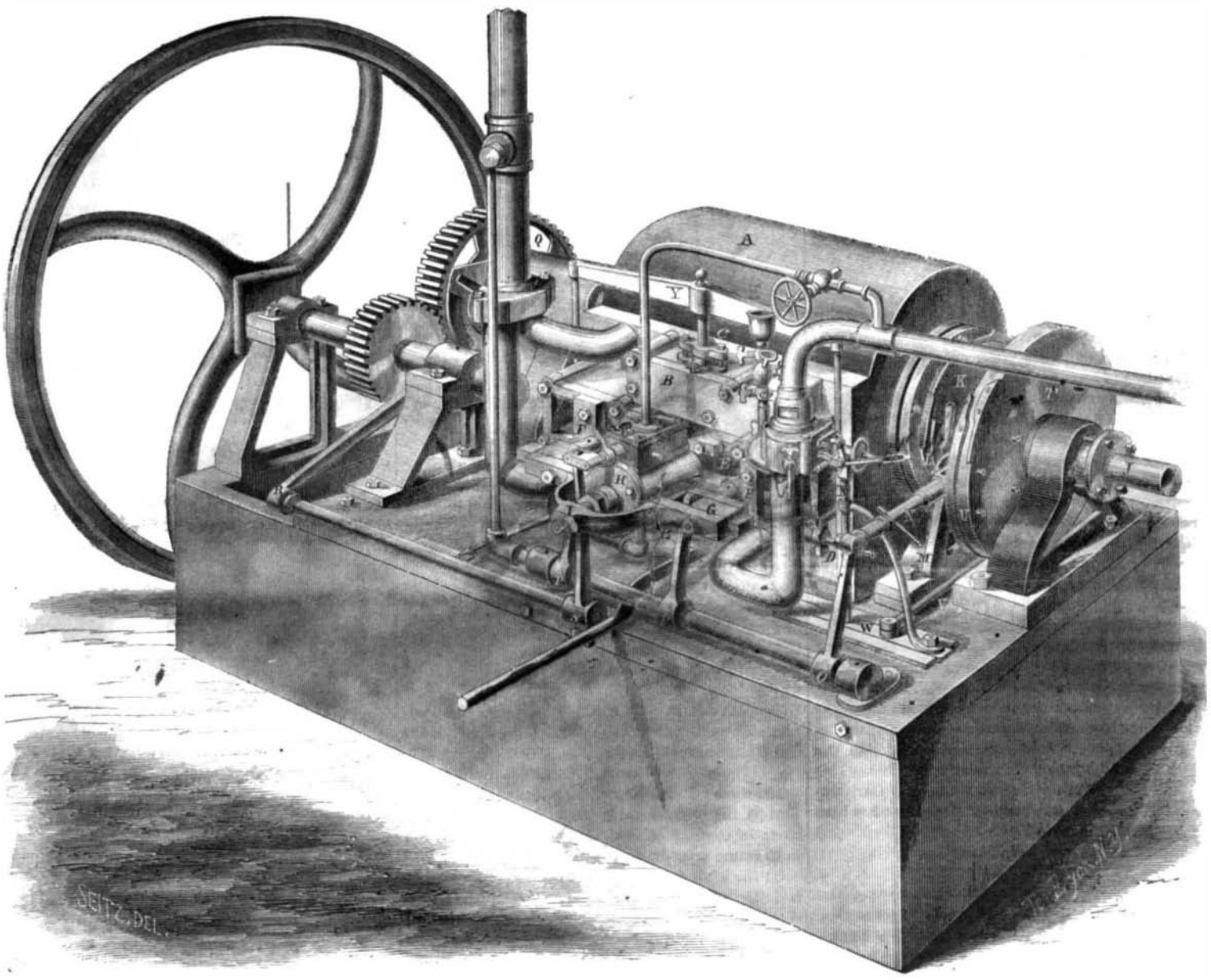
Scientific American.

A WEEKLY JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

VOL. VIII.—NO. 21. (NEW SERIES.) | NEW YORK, MAY 23, 1863. | SINGLE COPIES SIX CENTS. $3 PER ANNUM—IN ADVANCE.



CHRISTENSEN'S PATENT ROTARY ENGINE.

We illustrate this week a rotary engine which is in most respects extremely novel. The object of the rotary engine, originally, was to produce a more simplified application of steam than was effected by other patterns. The inventor of this engine seems to have taken another view of the subject; he has enlarged upon his first idea, and from time to time added certain parts he deemed wanting until the machine arrived at its present stage. It is not quite perfect yet and will require some other changes, so we are assured, to make it still more effective. A brief explanation will render the working details of this engine intelligible to the reader.

The cylinder, A, is mounted on a bed-plate, as usual; it is 14 inches in diameter and about 20 inches face. Around the outside of the cylinder there is a steam jacket, which the exhaust passes through and prevents internal condensation. The cylinder has two steam chests, B B, bolted to it, in which are the reversing valves, C, and the main valves which admit the steam to perform the revolutions of the piston; one of these last-mentioned valves can be seen at D; the other one is hidden by the intervention of the throttle valve-chamber between it and the observer. The steam chests (one above and the other below) are separated by the rectangular opening, E. This opening and the parts belonging to it comprise the principal feature of the engine, that is the sliding partition. Other inventors have essayed the same feature, but the method by which the motion is produced is novel to us. The partition is simply a metallic block, fitted with steam-tight packing, working in the opening just-mentioned. The partition is connected with the operating machinery by rods (like valve stems) fastened to each end of it and working through the guides, F, bolted across the opening. To these rods the cross-head, G, is keyed. The cross-head is of the spade-handle variety, and embraces a small steam cylinder, H (between the rods), whose piston rod is attached to the cross-head by nuts, as seen at I. Let us now examine the means by which this partition is worked so as to open and close the connection in the cylinder. On the main shaft, J, there is a wheel, K, secured, which has a cam groove in it partially seen at L; in this groove a sliding block is fitted which is in turn secured to the long arm, M. To this arm the rod, N, is jointed to the rock-shaft arm, O. On this shaft are two other arms, P, the ends of which work in recesses in the cross-head prepared for their reception. These arms and the steam cylinder before-described move the partition in and out. As the piston revolves the partition is, of course, stationary until the motion brings the piston around to the movable partition. When this takes place the partition recedes swiftly, and the piston passes by to continue its stroke. Immediately on its passage the partition flies back in close contact with the main body of the piston drum and is kept there by the pressure in the small cylinder. A reciprocating mo-

© 1863 SCIENTIFIC AMERICAN, INC.

tion is given to the smaller steam piston contained in the cylinder, H, by an eccentric groove in the gear, Q; from this groove motion is transmitted by the arm, R, and the shaft it is keyed on, to the valve stem, worked by the vertical arm, S. Let us now turn to the means which admit the live steam to the main piston, and if we do so we shall see that there is a large iron disk, T, on the main shaft, which has a groove, U, formed on its edge by metallic strips; in this groove the rod, V, engages and (being fastened at the opposite end from the reader) moves the slide, W, as the piston revolves. On this slide there is an upright arm, X, on which the valve stems, D, heretofore-mentioned, are secured; they work through the small stuffing-boxes, seen in close proximity to them. The valves themselves are in the same chests as the reversing valves. The reversing valves are contained in either chest, and connected by side-rods to the cross-heads, Y—one in sight, the other invisible under the steam-chest. The handle projecting in front is provided for the purpose of changing the motion of the engine forward or backward by shifting the reversing valves either way.

We have thus described the principal details of this invention, and having exhausted the alphabet we shall proceed no further in this direction. The operation of the engine is very similar to all others. The piston (a single one fitted in a drum) revolves as the steam enters through the pipes, Z. When it nears the sliding partition the latter recedes and permits it to pass by, closing immediately thereafter. When the piston slides over the opening made by the secession of the partition, the packing in the end of it would strike the sharp edges were not some provision made to guard against such disaster. This is done by means of another cam (not seen in the engraving), which draws the packing into the piston and lets it rotate without injury. So also with the arrow-headed indicator and scale; the other end of this instrument works in a straight groove turned in the main shaft. If the lateral movement of the piston drum is too great it is immediately shown on an exaggerated scale by the indicator.

The inventor of this machine admits that it is very complicated, and thinks he could simplify it materially by making another. The steam leaked out considerably through the partition opening when we saw it in operation, caused, we were told, by defective workmanship. All the small cocks about the engine are provided for the purpose of drawing off the condensed water. The engine will, in our opinion, require much cutting down before it will be as efficient as it should be, and the hammering and pounding caused by the opening and shutting of the partition should be obviated as far as possible. This engine was patented on Sept. 3, 1861, by C. Christensen, of New York. One half of the patent has been assigned to C. and A. Hövet, corner of Myrtle and Carlton avenues, Brooklyn, N. Y.

THE PLAGUE OR "BLACK DEATH."

We have just received from Daniel E. Delavan, City Inspector of New York City, a copy of his annual report for 1862, which is of unusual interest. It contains a complete review of the sanitary condition of the city during that year, with much other matter relating to the causes of disease and sanitary reform. We thank Inspector Delevan for this report, which we regard as a most valuable contribution to sanitary literature. As an example of the interest which attaches to this volume, we refer the reader to the following graphic account of the "Plague":—

The "Black Death," or, as it was called in some countries, the "Great Mortality," was preceded by mighty revolutions in the organism of the earth, of which we have credible information. From China to the Atlantic, the foundations of the earth were shaken; throughout Asia and Europe the atmosphere was in commotion, and endangered, by its baneful influence, both vegetable and animal life.

The series of these great events began in the year 1333, fifteen years before the plague broke out in Europe; they first appeared in China. Here a parching drought, accompanied by famine, commenced in the tract of country watered by the rivers Kiang and Hoai. This was followed by such violent torrents of rain, in and about Kingsai, at that time the capital of the empire, that, according to tradition, more than 400,000 people perished in the floods. Finally, the mountain Tsincheon fell in, and vast clefts were formed in the earth. In the succeeding year (1334), passing over fabulous traditions, the neighborhood of Canton was visited by inundations; whilst in Tche, after an unexampled drought, a plague arose, which is said to have carried off about 5,000,000 people. A few months afterwards an earthquake followed, at and near Kingsai; and, subsequent to the falling-in of the mountains of Ki-ming-chan, a lake was formed of more than a hundred leagues in circumference, where, again, thousands found their grave. In Howkouang and Ho-nan a drought prevailed for five months; and innumerable swarms of locusts destroyed the vegetation, while famine and pestilence, as usual, followed in their train. Connected accounts of the condition of Europe before this great catastrophe are not to be expected from the writers of the fourteenth century. It is remarkable, however, that simultaneously with a drought and renewed floods in China, in 1336, many uncommon atmospheric phenomena, and in the winter frequent thunder storms, were observed in the north of France; and, so early as the eventful year of 1333, an eruption of Etna took place. According to the Chinese annals, about 4,000,000 of people perished by famine in the neighborhood of Kiang in 1337; and deluges, swarms of locusts, and an earthquake which lasted six days, caused incredible devastation. In the same year, the first swarms of locusts appeared in Franconia, which was succeeded, in the following year, by myriads of these insects. In 1338, Kingsai was visited by an earthquake of ten days' duration: at the same time, France suffered from a failure in the harvest; and, thenceforth, till the year 1342, there was in China a constant succession of inundations, earthquakes and famines. In the same year, great floods occurred in the vicinity of the Rhine, and in France, which could not be attributed to rain alone; for, everywhere, even on the tops of mountains, springs were seen to burst forth, and dry tracts were laid under water in an inexplicable manner. In the following year, the mountain Hong-tchang, in China, fell in, and caused a destructive deluge; and, in Pien-tcheou and Leang-tcheou, after three months rain, there followed unheard-of inundations, which destroyed seven cities. In Egypt and Syria, violent earthquakes took place; and, in China, they became from this time, more and more frequent; for they recurred in 1344, in Van-tcheou, where the sea overflowed in consequence, in 1345, in Hi-tcheou, and in both the following years in Canton, with subterraneous thunder. Meanwhile, floods and famine devastated various districts, until 1347, when the fury of the elements subsided in China.

The signs of terrestrial commotions commenced in Europe in the year 1348, after the intervening districts of country in Asia had probably been visited in the same manner.

On the island of Cyprus, the Plague from the East had already broken out; when an earthquake shook the foundations of the island, and was accompanied by so frightful a hurricane that the inhabitants who had slain their Mahometan slaves, in order that they might not themselves be subjugated by them, fled in dismay, in all directions. The sea overflowed—the ships were dashed to pieces on the rocks, and few outlived the terrific event, whereby this fertile and blooming island was converted into a desert. Before the earthquake, a pestiferous wind spread so poisonous an odor, that many, being overpowered by it, fell down suddenly, and expired in dreadful agonies. This phenomenon is one of the rarest that has ever been observed, for nothing is more constant than the composition of the air; and in no respect has nature been more careful in the preservation of organic life. Never have naturalists discovered in the atmosphere foreign elements, which, evident to the senses and borne by the winds, spread from land to land, carrying disease over whole portions of the earth, as is recounted to have taken place in the year 1348. It is, therefore, the more to be regretted, that in this extraordinary period, which, owing to the low condition of science, was very deficient in accurate observers, so little that can be depended on respecting those uncommon occurrences in the air should have been recorded.

Yet, German accounts say expressly that a thick, stinking mist advanced from the East and spread itself over Italy; and there could be no deception in so palpable a phenomenon.

The credibility of unadorned traditions, however little they may satisfy physical research, can scarcely be called in question when we consider the connection of events; for just at that time earthquakes were more general than they had been within the range of history. In thousands of places chasms were formed, from whence arose noxious vapors; and, as at that time natural occurrences were transformed into miracles, it was reported that a fiery meteor, which descended on the earth far in the East, had destroyed everything within a circumference of more than a hundred leagues, infecting the air far and wide. The consequences of innumerable floods contributed to the same effect, vast river districts had been converted into swamps; foul vapors arose everywhere, increased by the odor of putrified locusts, which had never perhaps darkened the sun in thicker swarms, and of countless corpses, which, even in the well-regulated countries of Europe, they knew not how to remove quickly enough out of the sight of the living. It is probable, therefore, that the atmosphere contained foreign and sensibly perceptible admixtures, to a great extent, which, at least in the lower regions, could not be decomposed, or rendered ineffective by separation. Pursuing the course of these grand revolutions further, we find notice of an unexampled earthquake, which, on the 25th of January, 1348, shook Greece, Italy, and the neighboring countries. Naples, Rome, Pisa, Bologna, Padua, Venice, and many other cities suffered considerably. Whole villages were swallowed up, castles, houses and churches were overthrown, and hundreds of people were buried beneath their ruins. In Carinthia, thirty villages, together with all the churches, were demolished; more than a thousand corpses were drawn out of the rubbish; the city of Villach was so completely destroyed that very few of its inhabitants were saved; and, when the earth ceased to tremble, it was found that mountains had been moved from their positions, and that many hamlets were left in ruins. It is recorded that, during this earthquake, the wine in the casks became turbid, a statement which may be considered as furnishing a proof that atmospheric changes, of a character hitherto unknown, had taken place; but if we had no other information from which the excitement of conflicting powers of nature, during these commotions, might be inferred, yet scientific observations, in modern times, have shown that the relation of the atmosphere to the earth is changed by volcanic influences. Why, then, may we not, from this fact, draw retrospective inferences respecting those extraordinary phenomena? Independently of this, however, we know that, during this earthquake, the duration of which is stated by some to have been a week and by others a fortnight, people experienced an unusual stupor and headache, and that many fainted away.

These destructive earthquakes extended as far as the neighborhood of Basle, and recurred, until the year 1360, throughout Germany, France, Silesia, Poland, England and Denmark, and much further north.

Great and extraordinary meteors appeared in many places, and were regarded with superstitious horror. The order of the seasons seemed to be inverted; rains, floods, and failures in crops were so general that few places were exempt from them; and though an historian of that century assures us that there was an abundance in the granaries and storehouses, all his cotemporaries, with one voice, contradict him. The consequences of failure in the crops were soon felt, especially in Italy and the surrounding countries, where, in this year, a rain which continued for four months, had destroyed the seed. In the larger cities they were compelled, in the spring of 1347, to have recourse to a distribution of bread among the poor, particularly at Florence, where they erected large bake-houses, from which, in April, ninety-four thousand loaves of bread, each of twelve ounces in weight, were daily dispensed. It is plain, however, that humanity could only partially mitigate the general distress, not altogether obviate it.

Diseases, the invariable consequence of famine, broke out in the country, as well as in cities; children died of hunger in their mothers' arms; want,

© 1863 SCIENTIFIC AMERICAN, INC.