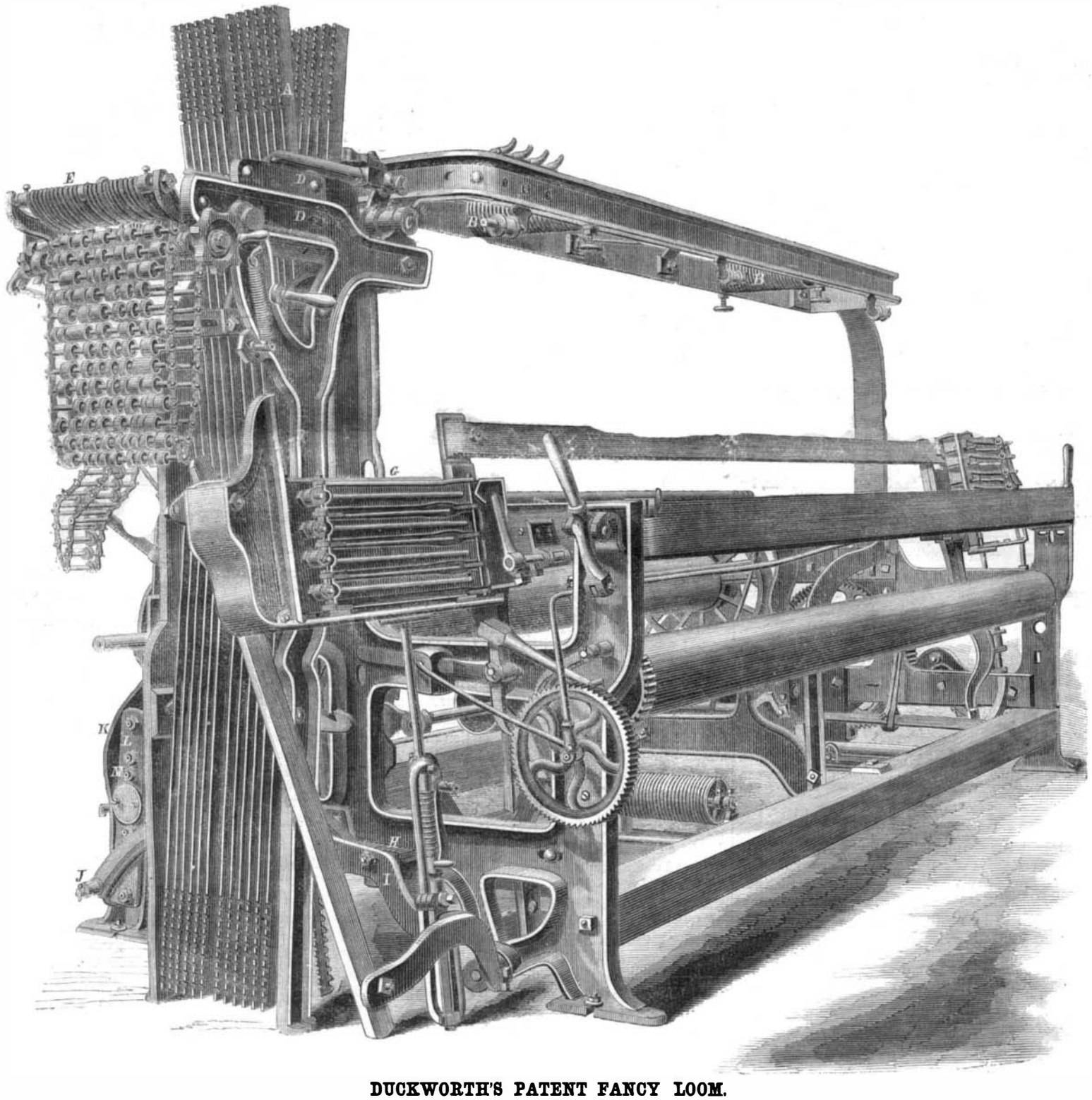
Scientific American.

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

Vol. XV.—No. 12. [NEW SERIES.] NEW YORK, SEPTEMBER 15, 1866. $3 per Annum, [IN ADVANCE.]

Improved Fancy Loom.

The loom here illustrated is designed for weaving all kinds of figured fabrics, such as cassimeres, balmorals, shawls, woolen shirting, broadcloths, and all styles of fancy cotton and woolen goods.



DUCKWORTH'S PATENT FANCY LOOM.

The principal improvements on the loom are the harness motion and deep-box motion. The harness motion is shown at the left of the engraving; it will take in twenty-four harnesses. A is the side eddle lever, pivoted at the center and vibrating in both directions. It is connected to the eddle frames with round leather straps—not shown—passing around the pulleys, B B. The side eddle levers are provided with a series of notches for the purpose of obtaining more or less "shed" on the yarn. The motion is operated by a rock shaft having its bearings at C, and connected to knives sliding in parallel ways—not shown—at D D. One of these knives slides in one direction and the other in the opposite one. There is a set of hooked jacks connected to the side eddle levers, passing between the knives and resting on a set of levers, pivoted at E, and passing over the chain, F. If there are pulleys on the chain, F, they will raise one or more of the levers and elevate the hooked jacks to the upper knife, and as the knife moves it will carry the jack and vibrate the side eddle lever in the same direction. If there are no pulleys on the chain, F, the levers, E, will remain down, and the hooked jacks will rest on the lower knife; and, as the knife moves, will carry the hooked jack and vibrate the side eddle levers in an opposite direction. The chain, F, can extend to the floor without interfering or being supported.

This motion is built very strong and is designed for weaving heavy and light goods. It is secured by Letters Patent dated August 1, 1865.

Next is the novel arrangement of the deep-box motion that is creating considerable interest among manufacturers. This motion commands any shuttle or color out of four, a point that has been long sought for, but has not heretofore been accomplished with success. The shuttle boxes, G, are operated by an inclined-plane-shaped cam, sliding at H, on which the shuttle-box lever, I, rests. The cam, H, is connected to a cross-arm, at J, which is vibrated by hooked arms, connected at K L M, which are attached at different distances from the center or pivot, and are operated by a vibrating lever—not shown—and governed by the pattern chain, N. If the bracket arm connected at K, be operated, it will move single boxes; but if the hooked arm, connected at L, be operated, it will skip from the first box to the third; and if the hooked arm, connected at M, be operated, it will skip from the first to the fourth box, or what is called fall deep or four boxes. The boxes are carried in the same way by similarly hooked arms attached at the lower end of the cross-arm. The shuttle boxes on the opposite end of the loom are operated by a shaft passing through the loom and connected to the cross-arm.

This motion is secured by Letters Patent, dated January 9, 1866. The rest of the movements of the loom are similar to those on an ordinary loom, but are of improved patterns. These looms are built for broad or narrow goods. For further information address Duckworth & Sons, Mount Carmel, Conn.

TWENTY-FIVE YEARS---A RETROSPECT.

In looking back through the dim vista of the past, and noting the world's advancement, we can detect no era so fruitful in results as that embraced within the period of the last twenty-five years. The great discoveries in science and the arts, the numerous useful inventions, the wonderful expansion of commerce, the finding of inexhaustible mines of precious metals, and the rapid growth in wealth and population, all tend to make the last quarter of a century unparalleled in the world's history. The whole civilized world has felt the impetus of growth and expansion, and we are happy to believe that our own favored land, untrammeled by the traditions and dead forms of the Old World, has not only distanced all other nations in the race of progress, but has, by its example of energy and enterprise, infused new life into effete and decaying nationalities.

Less than twenty-five years ago the first successful experiment with electro-telegraphy was made, though it had been the subject of investigation for some years previous. A wire was stretched from Washington to Baltimore in 1844, and soon after extended to New York, and very rapidly throughout the country and the world, till, at length, the earth is girdled, and time and space are literally annihilated. The author of this wonderful discovery still lives, in the enjoyment of a green old age, rich in honors and the substantial rewards of his genius.

Twenty-five years ago ocean steam navigation was a new thing, and its practicability had just been demonstrated. True, years before a little steamer, known as the *Savannah*, had crossed the Atlantic, but her daring feat had long been forgotten, never, perhaps, to be recalled, had not the Western World been waked up one morning by the astonishing news that the *Sirius*, a small English-built steamer, had arrived from London. The *Sirius* was soon followed by the *Great Western*—and thenceforth, ocean steam navigation became a fixed fact. Before, there had been no steamships, only steamboats—useful craft on lakes and rivers, and other inland waters—but the idea that steam could be made available for navigating the ocean had long been scouted in high places. Twenty-five years ago there were no steamships of war, but, ocean steam navigation having been demonstrated as practicable, the nations ceased to build sailing vessels for war purposes, and rapidly substituted steamers.

Twenty-five years ago most of the inventions of agricultural machinery, which now so lighten the labors of the farmer, while they increase his gains, were unknown. Who ever heard of the reaping machine till it made a sensation at the London Exposition in 1850? It must have had a brief existence before that, for it was sent, a perfected engine, from Chicago to London; but how few had ever heard of it; and now, who would think of working even a twenty-acre farm without its aid?

Twenty-five years ago there were railroads with locomotive engines, but they date only a few years anterior. The writer of this well remembers reading the account of Mr. Stephenson's first sucess in England, and he has not forgotten when the first short line was put in operation in this country. Twenty-five years ago railroad connection between the Hudson River and Lake Erie was scarcely completed, the Erie and the Hudson River lines were hardly thought of, and in the Great West, where the railroad may be said to have achieved its greatest triumphs, it had no existence at all. If the last twenty-five years did not witness the origin of the railroad, it has seen its wonderful expansion, until this country and Western Europe have been converted into gigantic gridirons by the crossing and interlacing of iron bands, and all other modes of land travel have become nearly obsolete, and a five-mile journey in an old-fashioned stage coach is more to be dreaded than a hundred miles in a rail car.

Twenty-five years ago California was unexplored and uninhabited, save by Indians and a few Mexican adventurers and outlaws, and its wealth of precious ores was a well-kept secret; and the other gold-producing States and Territories—Nevada, Colorado, Arizona, Montana, and Idaho—now so familiar to every ear, had no existence, save as they formed parts of the great unexplored Far West of the Rocky Mountain region.

Twenty-five years ago a hundred thousand dollars was regarded as a magnificent fortune, to which, though many aspired, few attained; and the number in the metropolis of the Western World whose estates reached this figure could be counted on one's fingers. There are more men in New York to-day whose annual incomes reach one hundred thousand dollars, than there were twenty five years ago of those whose entire possessions amounted to as much. Twenty-five years ago there were, possibly, half-a-dozen millionaires in the whole country. To-day they may be counted by hundreds.

Twenty-five years ago the population of the city of New York was little over three hundred thousand. To-day it is a round million, and the overflow into the adjacent country may be reckoned at half a million more.

Twenty-five years ago the population of the Empire State was less than two and a-half millions. To-day it cannot be much less than five millions.

Twenty-five years ago the population of the entire country was only seventeen millions. To-day it is nearly forty millions.

Twenty-five years ago there were twenty-eight States in the Union. To-day there are thirty-six, with half-a-dozen more to be added within a few years.

The world moves; but such wonderful strides as it has made within the last twenty-five years former generations never saw. Every department of life has felt and seen its accelerated motion; and it is almost enough to make one feel giddy to look back over the last quarter of a century and witness the rapid succession of discoveries in art and science, and the wonderful increase in wealth and population.

And what is the secret? It is the wonderfully-developed spirit of invention which has infused energy and enterprise into the world, and encouraged men to undertake the accomplishment of things which, without the inventor's aid, would have been wild and chimerical.

In 1840, the United States Patent Office issued lees than five hundred patents; in 1865 it issued six thousand. This is the key to the whole secret. Of the fifty thousand patents issued during the last twenty-five years in this country, some doubtless were worthless; others were of little account; while a very large number were of value beyond the power of man to compute. Their importance to commerce, to manufactures, to mining, and to agriculture, cannot be estimated. Who will undertake to compute the value of the sewing machine, to cite a single example; or how long would the gold fields of California have continued to give a profit to the miner, if the inventor had not come to his aid?

To the inventor and the mechanic, then, rather than to the statesman and the politician, is the world indebted for the wonderful growth of the last twenty-five years. They are the pioneers in the great army of progress, the *avant couriers* of every great social and moral revolution. ANTIQUARY.

Williams's Theory of the Diffusion of Steam.

[For the Scientific American.]

Charles Wye Williams, whose death was noticed recently, was for nearly forty years superintending agent of the Dublin and Liverpool Steam Packet Company. His practical experience in all the details incident to steam navigation, combined with a good share of scientific knowledge, render his opinions worthy of more than ordinary weight. The subjects to which his attention were more particularly directed, were the combustion of coal, heat, and steam.

Upon the former subject he published a work many years ago, which has become a text-book wherever it has been introduced. His views and opinions—the result of his own experience—received the sanction of such men as Dr. Ure, Prof. Brande, Robert Kane, and others of scarcely less note in the scientific world. A vast saving in fuel was the immediate result of adopting his system; and most of the patented devices of the present time, for mingling a suitable quantity of oxygen with the products of combustion, are but modifications of his discoveries and experiments. He was essentially a practical man, and where possible, he never failed of illustrating his ideas by diagrams and presenting them in visible form to the eye. At a much later day he published a work upon heat and steam, but his views upon these subjects, although the result of his own experience and observation, after a long and patient investigation, seem to have received but little attention, for the reason, probably, that they were opposed to the received opinions of the day. They, at least, brought him in collision with those whose previous writings had been considered as law upon the subject. The distinctive feature of the work is his doctrine of the diffusion of steam through the mass of the water. He contends that when a steam boiler is under pressure there is just as much steam contained in a cubic inch of the water space as there is in a cubic inch of the steam space. The water is, in fact, so far as the steam is concerned, empty space, or a vacuum into which the vapor enters. In this view he was supported by the previously-written opinion of Dr. Dalton, Sir John Herschel, and others, in their remarks on the diffusion of gases and vapors through liquids. He carried out to its legitimate result the now generally received "atomic theory," illustrating his position by diagrams of his experiments, and seeming, at least, to settle the point in his own favor.

In relation to the explosion of steam boilers, he repudiates the idea that heat can be "stored up" in the water, or that the water can flash into steam when relieved of pressure, according to Colborn and Clark, Dr. Alban, and many others. But he contends that the globules of steam in the water, being confined in a medium over eight hundred times as dense as the steam alone, fly into the steam space instantly when the pressure is removed, and there expand in volume in proportion to the density of the two mediums, or over eight hundred times. If the boiler was already strained to near its bursting point, a disastrous result might well be anticipated. If his theory of the diffusion of steam through the water is correct, we may pretty safely assume that his theory of steam boiler explosions will account for some, at least, of those disasters.

There are other phenomena in connection with this subject of heat and steam which can scarcely be accounted for upon any other hypothesis than that of Mr. Williams. For instance. Why will the temperature of water, in a steam boiler, when heated to say 300 deg., fall to 212 deg., or the boiling point, as soon as the pressure is removed, no matter how suddenly? Water, compared with vapor, is a solid body, and any other solid body, as metal, for instance, would retain its high temperature for a long time. But the mercury, though plunged to the center of the mass of water, will, just as soon as the pressure is removed, drop to the boiling point.

H. N. T.

GOLD quartz is profitably mined in Australia when it yields only two dollars per tun.