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THE SCIENTIFIC AMERICAN SUPPLEMENT,
No. 78,
For the Week ending May 26, 1877.

THE RISE OF THE SEWING MACHINE.

On the 8th instant, the patent granted to John Bachelder, first for fourteen years from May 8, 1849, and subsequently twice extended over periods of seven years each, expired. With this patent terminates the series under which a combination of sewing machine manufacturers have been enabled to sustain a monopoly to which the people have paid a colossal tribute. The period has therefore been attained when the sewing machine, in its fundamental and essential features, becomes public property. At some future time, we propose to publish a detailed history of the means whereby this great invention has been developed, and of the influences by which it has been controlled. At present it seems fitting to glance back to the circumstances of its production, to note the effect of the lapse of the patent above referred to, and briefly to review the benefits which the sewing machine has conferred upon the world.

As is the case with the majority of inventions which in course of time have become of immense value, the idea of making a machine that would accomplish the given purpose was by no means original with the inventors who contributed the devices which in the end proved fundamentally necessary to the practical apparatus. Doubtless the problem of producing mechanism capable of sewing has vexed the minds of inventors ever since man began to invent; and the meager records which we have of early atttempts in that direction doubtless afford no idea of the same in point of numbers or of frequency. In 1755, Weisenthal patented in England a needle with the eye in the middle, which was operated by hand. Alsop also, in England, in 1770, patented an embroidery loom; and in 1804, Duncan devised machine embroidery by a number of hooked needles. Saint's machine, dated July, 1790, is the nearest approach to the modern apparatus; but this was only adapted to leather sewing, as the notched needle which pushed the thread through could not have been used on fibrous material. In 1825, Thimonnier, a poor tailor of St. Etienne, France, conceived the idea of sewing apparatus, and for sixteen years labored to develop the same. He achieved substantial success; and in 1841, two hundred of his machines were at work, making army clothing. In 1848, the machines were made of metal, and could work at the rate of three hundred stitches a minute. The political revolution in France during that year, however, ruined the inventor, and he died in great poverty in 1857.

The above brief statement covers what was first accomplished in Europe. As early as 1832, Walter Hunt, of New York, claimed to have made a lock stitch sewing machine; but he did not seek a patent until 1854, and then his application was denied on the ground of his having abandoned the invention, and on account of Howe's patent obtained in 1846. In 1842, John J. Greenough contrived a machine having a double pointed needle, with an eye in the middle, which was drawn through the cloth by pincers. This never got beyond the stage of a model. Benjamin W. Bean, in 1843, patented a machine for making a running or basting stitch, the needle passing through corrugations of the cloth; and George R. Corlies devised an apparatus similar to Greenough's shortly afterwards. None of these machines were brought into practical use.

In 1845, Elias Howe completed his first machine, and obtained a patent thereon in September, 1846. His principle covers the forming of the seam "by carrying a thread through the cloth by means of a curved needle on the end of a vibrating arm, and the passing of a shuttle furnished with its bobbin between the needle and the thread which it carries." There are four other claims relating to the lifting of the thread to form a loose loop, a means for holding the thread on the bobbin to prevent unwinding after the passage of the shuttle, a stitch tightener, and a baster plate. This machine, the Patent Office examiners evidently did not think of enough importance to notice in their detailed reports, as no reference is made to it in those documents for 1846. The SCIENTIFIC AMERICAN, however, noticed its production, and in doing so said: "The inventor of it has struck out a track of its own; and it would be difficult, by any means heretofore known, to sew as fast or as well as can be done by this machine." It is indicative of the tendency of thought of the time, as well as of the closeness with which inventors scanned our pages, that we were at once besieged with letters asking for more information about that machine; but Mr. Howe was reticent, and he, almost immediately after obtaining his patent, went to Europe, so that our readers' curiosity had to be satisfied with such information as our paper had already afforded.

In Europe the inventor endeavored to obtain capital for the manufacture of his machine; but he was met by a skepticism even more obdurate and discouraging than he encountered from those to whom he applied for the necessary aid here; and he returned home after two years, in a sailing vessel, paying for his passage by manual labor and arriving literally penniless. He remained extremely poor until after his many legal controversies against infringers terminated in his favor in 1854. We can recall his weekly visits to this office to purchase the SCIENTIFIC AMERICAN, when his circumstances seemed to be such that the four cents, required at that time for each copy, could hardly be afforded. The difficulty with Howe's original machine, it should be noticed, lay in the absence of a suitable feed motion. His needle moved horizontally, and the cloth was attached to the moving baster plate and carried along before the needle to the end of the plate's motion. Then the machine was stopped, the parts brought back to their first position, and the operation begun again.

Inventors were quick, however, to find out about Mr. Howe's invention, and to understand its failings. How many schemes were then projected, which proved abortive, of course cannot be told; but six years after we find ourselves stating in this paper that we "have illustrated no less than seven sewing machines." A year after that of Howe's patent, Morey and Johnson devised a single thread chain stitch machine. It was the first invention of the kind this journal ever illustrated, and the first ever presented fully to the public. Its engraving adorns the first page of the SCIENTIFIC AMERICAN of January 27, 1849. 'It sews about one yard per minute; and for upholsterers and bag makers is a valuable machine," we said. The feed motion was something like Howe's; the price $135. In the following issue, we illustrated a French machine, devised by M. Magnin. This had no feed motion, and our object in publishing it, if we recollect aright, was to exhibit its inferiority to the American machine. And the public did not form a very high opinion of the latter, which was about that time placed on exhibition in this city. We find ourselves a few years later telling our readers how we happened to be in an office on Broadway in 1848, when conversation arose regarding the new-fangled sewing machine. A committee of gentlemen went to the tailor's shop where it was exhibited to examine it, and, as was promised, it certainly sewed a very neat seam. But one of the party detected the operator in making a little knot on the thread after removing the sewn fabric; and watching his opportunity, he broke off the knotted portion and pulled the thread out—it being a single chain stitch, it all raveled out of course—and thereupon the committee laughed at the invention, pronounced it useless, and departed. Single thread chain stitch machines have become very popular since then; but after all, the hasty opinion of the committee, and probably of the public, was not without good results, for the next machine we illustrated (Lerow and Blodgett's) claimed as a great advantage that "every stitch in it is self-bound, and the seam will not rip out."

During the early part of 1849, there came into our office one day a quiet, spare-looking man, hailing from Pittsfield, Mass. After making a general survey of the premises, and convincing himself that he could trust us with his secret, he carefully untied a handkerchief and exhibited two models—one, a rotary steam engine, the other, a sewing machine. He could not afford, he said, to obtain patents for both, and he wanted to know which one was likely to prove most advantageous to him. We advised the sewing machine as the most promising of the two, although, if we remember correctly, we had but little faith in the latter at that time, and accordingly he authorized us to proceed. Our visitor was Mr. A. B. Wilson; and in the first crude model, which remained in our possession until a few years ago, was embodied the double pointed shuttle, making a stitch at each backward and forward movement; and perhaps there was also the germ of the second great sewing machine invention, namely, the feed motion. Even in this first machine, which we illustrated soon after it was patented, there is a novel feed device. Mr. Wilson's completed invention was the "four motion" feed, which consists in moving a serrated bar, in a slot in the horizontal plate upon which the cloth is fed, in the direction of the four sides of a parallelogram. The teeth carry the cloth forward while moving horizontally a short space above the surface of the plate; the bar then drops (the second motion), then passes backward horizontally beneath the plate (the third motion), and, rising, brings the teeth through the slot and above the surface (the fourth motion). In our issue of March 29, 1851, we find an extended notice of an improved Lerow and Blodgett machine, on which one girl could sew six overcoats in one day, and a very expert hand twenty pairs of pantaloons.

We have not space to enter into the details of other early sewing machines, most of which are represented in the back files of the SCIENTIFIC AMERICAN. Isaac M. Singer's first patent was obtained in 1851 for a method of tightening the stitch and other improvements in the single-thread or chain-stitch machine. Afterwards he devised the peculiar feed motion known as the wheel or continuous feed. It proved a most valuable invention. J. E. A. Gibbs, of Millpoint, Va., invented the rotating hook which produces a twist in the loop stitch. The first rotating hook was patented by Wilson in 1851. Charles H. Willcox invented the automatic tension; and in the Grover & Baker machine (1851-2) was first introduced the double loop stitch employing two threads, effected by a circular, horizontally moving needle. In some machines this stitch is made by the shuttle. It will suffice here to point out that the vibratory eye-pointed needle, the reciprocating shuttle, the rotating hook, and the four-motion feed are the essential foundation elements of the sewing machine patents; and it follows as a matter of course that whoever controls not merely all but any one of these devices must exercise a potent influence over the entire industry. For some time the owners of these patents exercised sharp rivalry; but eventually they settled their differences, consolidated their several interests, and thus formed a combination which has enjoyed, during the lifetime of the several patents under its control, an impregnable monopoly. In due time, one by one of these patents expired; and probably in the whole history of legislation cannot be found instances where more persistent effort or more powerful influence was exerted to secure extension after extension. Finally all lapsed except the Bachelder and the Wilson feed motion. The latter ended after two extensions in 1871. Every Congress since then has been besought to grant still further extension; and our readers will remember how persistently we have opposed the at-

tempts and explained their objects and bearing on the public interests. The last stronghold of the combination resided in the Bachelder patent, granted in 1848, and containing a claim sufficient to protect the feed motion. This patent the combination unearthed and purchased many years ago. It was twice extended; and, as we stated in the beginning, its demise marks the expiration of all the fundamental sewing machine patents.

In order to appreciate the effect of this event, its double influence must be regarded, first, as affecting inventors, and second, as affecting the public. So long as the combination controlled the features which are absolutely necessary to every sewing machine, they protected themselves against competition in their high prices, and also derived a large revenue from the royalties they imposed. In this way the inventor of a good and valuable improvement in the machine was at their mercy. They could prevent his applying his device by charging him a royalty so large that he could not afford to sell his machine at any attainable price, or else could compel him to sell out to the combination at their price. It is estimated that, since the grant of the Wilson patent, nearly half a million dollars has been expended by inventors on sewing machine modifications, much of which has proved a total loss. Now the inventors can employ the necessary elements referred to freely; and as a result we may look for still further improvements, and a large increase in the number of sewing machine manufacturers.

As regards the public, the influence of change is at once apparent in the decreased price of machines, the reduction in the case of some of them being already 50 per cent. This will be a great blessing to those to whom the sewing machine is a means of support.

It would be difficult to find a more significant commentary on the beneficial influence of our patent system than is embodied in the history of the sewing machine in the United States. For more than thirty years the people have paid out enormous sums, and have rendered those who devised and those who developed the important inventions connected with it royally wealthy. On the Bachelder patent alone, it is reported that the combination has made $4,000,000. A single company, the Singer, it is said, has $15,000,000 invested in the business, and the other great corporations have amounts of proportionate magnitude. Yet when the immense aggregate which has been paid for the sewing machine comes to be balanced beside the benefits the people have gained through that invention, there can be no question but that the cost to them is inconsiderably low. For the millions we have given, we have secured the establishment in the manufacture of the sewing machine of a new and vast industry, giving employment to thousands and opening up new utilizations of our resources. This great industry has in turn promoted minor ones. It has compelled the acquirement of the skill on the part of moulder and pattern maker to produce castings of extremely fine finish; and the benefits thus gained have made themselves felt over all the metal-working arts. The decoration of the machine has resulted in great improvements in the arts of japanning, inlaying, and electroplating. The necessity of the use of smooth strong thread has given rise to the manufacture of an improved material in immense quantities. The manufacture of sewing machine needles is also becoming almost a separate industry. Consider, besides, the immense multiplicity of attachments to the sewing machine which have been devised—the hemmers, braiders, tuckers, corders, fellers, improved treadles, etc.—all sources of revenue, and of employment—and the quantity of special machinery necessary for the production both of these devices and of the machine itself. And finally, for the millions that we have paid, the owners of the controlling patents have gone on and improved and developed the sewing machine with wonderful rapidity, and this is only one class of benefits. Who can estimate the value of the sewing machine to the people at large? It has revolutionized every industry wherein textile fabrics are made up into special forms. It has cheapened every variety of wearing apparel, from hats to shoes. It has furnished a means of livelihood to millions of our people, and has enlarged the field and increased the rewards of female labor, in fitting accordance with the demands of the hour. And all these vast advantages have been extended to no one people, but to all mankind. Can it be said that these gains, utterly inestimable as they are pecuniarily, have not been cheaply purchased at the cost of the few years' monopoly wherewith the laws have rewarded the inventors?

THE FATE OF THE LAST MAN.

In all the discussion which has agitated the world over the Mosaic and geological accounts of the creation, no question has been more argued than that of the origination of the race. There is nothing like variety, even in scientific argument; and we have heard so much disputation as to whether Adam or an anthropoid ape was our primal ancestor, that we are now impelled to turn to the diametrically opposite end of creation, and consider not the beginning of the first but the end of the last man. Speculation as to future events—especially if several billion or so years distant—is not particularly profitable; but if a personal originator of the race is to be made an object of present theory, similar theorizing as to the personal terminator of the race is certainly just as useful, both hypotheses being equal in the speculative nature of their basis: and it being certain that we cannot know anything more definite about the subject of the one than about that of the other.

M. Alphonse de Candolle points out that the terrestrial surface is constantly diminishing, and that elevated regions are being lowered through the incessant action of water, ice, and air. Besides, earthy matter, washed or ground away, is being carried into the sea, which is thus filling up; consequently in course of time the present configuration of the land will change. Continents will be divided into islands, and these will be gradually submerged. The human race will be driven by the encroaching waters from island to island. Finally the sun will rise on a vast waste of sea dotted perhaps with far-separated islets which once were mountain peaks. One by one these will be submerged until finally but one is left: Kunchainjunga, the loftiest summit of the Himalayas, perhaps; or more likely, some new coral reef which an insect to-day is laboring, down in the depths, to build up. Here will perish the last man, and the body of the last relic of our race will be washed away by the waves of the mighty flood. Therefore (1) *if the last man does not starve to death he will probably be drowned.*

Another theory is that of the periodicity of deluge, proposed by Adhemar, which depends on the fact of the unequal length of the seasons in the two hemispheres. Autumn and our winter last with us 179 days. In the Southern hemisphere, they last 186 days. These seven days or 168 hours of difference increase each year the coldness of the pole. During 10,500 years, the ice accumulates at one pole and melts at the other, thereby displacing the earth's center of gravity. Now a time, it is reasoned, will arrive when, after the maximum of elevation of temperature on one side, a catastrophe will happen, which will bring back the center of gravity to the center of figure, and cause an immense deluge. The inventor of this theory fails to consider the probability of the center of gravity returning as gradually as it was displaced: but with this defect, the hypothesis from another point of view goes to show that (2) *the last man will certainly be drowned.*

Every few years or so we have a comet scare; and when the flaming star appears in the sky, there are plenty of nervous persons who fret themselves over the chances of our earth coming in contact with it. It is, of course, not without the limits of possibility that such a collision should occur. If it did, our globe would plunge into an atmosphere of gas, which, mingling with the air, say those who predict this mode of death to our planet, would produce an explosion which would destroy every living thing. Such being the case, the person capable of breathing deleterious gas longest would survive the rest; and therefore (3) *if the last man is not suffocated by cometary gas he will be blown up.*

It is believed by many astronomers that there is a retarding medium in space, based on the fact that Encke's comet, in thirty-three years, loses a thousandth part of its velocity. If the ether resists our earth's motion in its orbit, then the centrifugal force will be constantly lessened, while the action of gravity will remain constant: so that the earth will describe a spiral path, always approaching the sun. The effect of this would be to convert the tropics into a desert, which would gradually expand toward the poles, from about which the ice and snow would be quickly melted. Finally the intense heat would turn the whole globe into one barren waste; but before then the human race would have disappeared. The probabilities in such event point to the supposition that (4) *the last man will be sunstruck.*

There are certain classes of rocks which are constantly becoming hydrated, and are thus occluding immense amounts of water. The theory has been broached that, in course of time, the seas will thus be dried up; and water being absent, our atmosphere will disappear, the earth becoming a waste similar to the moon. But before then, the atmosphere would probably become too rare for human existence. As the air pressure decreases, as M. Bert has shown, the privation of oxygen produces the deleterious effects experienced chiefly by aeronauts and mountain climbers. Consequently, in view of this theory (5), *the last man will be suffocated.*

Our sun itself may come to an end in two ways. First, as Mr. Proctor has recently very graphically explained, being but a variable star it may suddenly blaze up, and go out as other suns are known to have done. In this case, the intense heat of the colossal conflagration would destroy everything on the earth, and perhaps even vaporize the earth itself. Should this event occur (6), *the last man will be burned up.*

Or the sun may cool down. The glacial zones would thus enlarge, the race will be crowded nearer and nearer to the equator, by the encroaching glaciers coming from the poles. The small space will no longer support the life upon it, and in the terrible struggle for existence only the fittest will of course survive. Finally, after the earth becomes covered with the vast ice sheet, man with his wonderful capacity of adaptation to surrounding circumstances will probably subsist for a certain period, but in the end the constantly augmenting coldness will assert itself, and thus eventually (7) *the last man will be frozen to death.*

It has been suggested that the cooling of the earth will lead to the production of immense fissures in its crust similar to those already visible in the moon. The surface of the earth would thus be rendered extremely unstable, while the dwellers thereon for safety would be compelled to take refuge in caves. It is possible that the troglodytic remnant of the race might meet its fate in some great cataclysm or eruption, and hence it is assumable that (8) *the last man will be crushed in some subterranean cavern.*

Or supposing that the people adapted themselves to their surroundings and managed to live on the surface, until the time when the earth becomes so cracked and broken that, as predicted, it falls apart, flying off in fragments into space. Possibly a part may exist large enough to preserve its atmosphere. It may either be a satellite of the first larger body within whose sphere of attraction it may come: or it may fall into another world. In such case (9) *the last man will be killed by the crash of orbs;* but if he is not, and no one can tell to what extremes of resistance the race may develop, he will become an inhabitant of a new world. Evolution does not necessarily imply progress, and possibly the race may have retrograded until the human being possesses the nature of the plant louse; such being the case, this single inhabitant will spontaneously produce posterity of both sexes. A new race of men will begin, to continue *ad infinitum.* Hence (10) *there will be no last man.*

AMERICAN EXHIBITORS AT PARIS.

Mr. Joseph E. Holmes, well known to most persons who exhibited from this country at the first International Exhibition, in London, in 1851, and who has rendered service to our exhibitors at all the subsequent expositions, including the last two, at Paris and Vienna, quite laments that Congress should have adjourned without appointing any commissioners, or making any appropriation for the Great Exposition to be held in Paris next year. He thinks that, if Congress should take prompt action at the next session, it will be too late to get the contributions together and shipped in season to enable us to make a creditable show; and a letter from Mr. Holmes, which we print on another page, will suggest to persons wishing to exhibit their wares the necessity of bestirring themselves and providing for their requirements for space, etc., instead of waiting for the action of Congress, which is uncertain and, in any event, slow.

The Oldest Locomotive Engineer.

To the Editor of the Scientific American:

Your correspondent, I. Van Buren, of Clarksville, Ga., is not, as you suppose, the oldest locomotive engineer now living; for while he can only claim having operated a Stephenson engine in the year 1832, historical records show that the writer designed and superintended the construction of the first fast locomotive engine, the "Novelty," during the summer of 1829; and that, in the month of October, he ran that engine on the Liverpool and Manchester Railway against George Stephenson's "Rocket," beating the latter in speed fully ten miles an hour. The London *Times*, whose correspondent witnessed a preliminary contest between several locomotive engines on the road mentioned, said, regarding the Novelty: "It was the lightest and most elegant carriage on the road; and the velocity with which it moved surprised and amazed every beholder. It shot along the line at the amazing rate of thirty miles an hour! It seemed, indeed, to fly, presenting one of the most sublime spectacles of human ingenuity and human daring the world ever beheld." (See *The Times*, October 8, 1829.) This testimony disposes of Mr. Van Buren's claim to seniority as a locomotive engineer. His important statement that he can, although 77 years of age, "mount a horse as spry as when 45 years old," induces me to advert to the less momentous fact that I work at the drawing table regularly from 8 to 10 hours every day at all seasons. With reference to actual age, the locomotive engineer of 1829, having been born as late as 1803, of course yields precedence to the spry horseman of Clarksville.

New York city. J. ERICSSON.

The Columbia College Professorships.

At a meeting of the trustees of Columbia College, held on May 7, 1877, Professor William P. Trowbridge, of the Sheffield Scientific School of Yale College, was unanimously elected Professor of Engineering. Professor Trowbridge will be assisted by one adjunct professor and by an assistant in drawing. Dr. Charles F. Chandler, late Professor of Analytical and Applied Chemistry in the School of Mines, was at the same meeting elected Professor of Chemistry in the College and School of Mines. He will be aided in his duties by three assistants, to be called instructors, who shall give instruction practically and by lectures in the three departments of analytical chemistry. After the present year, no chemistry will be taught in the regular academic course of the college excepting a few lectures to the sophomore class. Elective studies will probably be introduced to compensate therefor.

A Conservatory on the Roof of a Hotel.

That excellent plan which we have so often advocated, of turning the tops of houses in cities into gardens, has been carried out by the Palmer House in Chicago; and a portion of the roof of that hotel is now covered with a magnificent conservatory. The structure is entirely of glass and iron; and as it is built on an extension, its location is such that it opens directly out of the fifth floor corridor of the main edifice, which rises some two stories above. A fine collection of tropical and rare plants has been provided, and the regular heating apparatus of the house supplies ample warmth. The conservatory is open to guests of the hotel, and furnishes a delightful resort.

Bone Meal for Grapes.

The editor of the London *Horticulturist* asserts that among all the fertilizers proposed for the grape, none embody more of the necessary ingredients than bone meal. It should be applied as early in the season as possible. About a ton to the acre makes a dressing that will prove valuable for two or three years.