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SCIENTIFIC AMERICAN SUPPLEMENT

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LABOR AND MACHINERY.

It is an old cry, and one that has frequently been raised during the present century of industrial development, that improved machinery is the hostile competitor of the workingman. With the introduction of each new labor-saving device it was freely predicted that capital would be enriched, labor impoverished. It was so with the cotton gin and the loom; with the locomotive and the reaper; with the sewing machine and the typesetter. In each case the prophets were false prophets; not because they loved lying, but for lack of knowledge. Their outlook was too narrow. They mistook the little circle which included their own particular interests for the broad area of the industrial world at large.

When the weavers complained that the loom, by enabling one man to do the work of many, would throw a multitude out of employment, they did not foresee that the reduced cost of the product would multiply the demand for it so rapidly that the call for labor would increase tenfold.

When Stephenson demonstrated that freight and passengers could be hauled by locomotives over iron rails, the stage, driver, the 'ostler and the innkeeper grew riotous, and declared that the bread was being taken out of their mouths. Yet to-day in the United States alone the railroad gives employment to nearly a million men, and by the stimulus which its transportation facilities have given to industry it is the indirect cause of the employment of ten millions more.

Elias Howe with his sewing machine in a public competition beat five of the swiftest sewing hands in a factory, and at once the cry went up that the new device would throw thousands of tailors out of employment. Instead of so doing, it made such a reduction in the cost of sewed goods that the increased demand called into existence an army of workmen and workwomen greater than ever existed in the days when sewing was done by hand.

It seems like the repetition of a mere truism to state that the cheapening of manufactured products by the invention of improved machinery has brought fifty men into employment for every one that it has thrown out; but there are some truisms which will bear, and which demand, occasional reiteration. We have noticed during the past few weeks that there is a tendency among the public speakers who are instructing the people in matters pertaining to industrial economy to attribute the present depression, at least so far as it concerns the great army of the unemployed, to the introduction of labor-saving machinery.

It does not come within our province, nor have we any intention of entering into a discussion of the political question of the hour; but when we see the ghost of this former bugbear resurrected from its proper oblivion and shaken in the face of our intelligent artisan classes of to-day, we feel that our duty as a journal devoted to the interests of the industrial arts calls for the utterance of a strong word of protest and emphatic denial. To raise again the cry that "machinery is displacing labor," as was done by a noted public speaker in a recent address, is to appeal to those unreasoning impulses which once caused a mob of cotton spinners to break into the house where Mr. Whitney was conducting his early experiments and wreck his half completed cotton gin. Of course, "machinery is displacing labor;" this is exactly what it was intended to do; but for one toiler that it displaces it brings in ten, nay, a hundred others, who are doing the work better, with less fatigue, in shorter hours and for an average wage which is greater in itself and far greater in the amount of food, shelter and clothing which it can buy than in any other period of the world's history.

The same speaker is correct when he says: "The introduction of machinery has marked a complete revolution in methods of production and in prices. The improved machines have worked wonders, have upset the calculations of the wisest, and their introduction has worked a total change in commerce, trade and transportation." But he is guilty of the most transparent sophistry when he attempts to show that the electric motor, for instance, is reducing the number of employed in the land, by quoting the case of a certain city, where "the street car companies introduced electricity on their lines" with the result that "two hundred and nine skilled mechanics, who had been engaged in shoeing the horses, laid their hammers down, quenched the fires in their forges, and walked out on the street to begin life anew." In the case of those discharged shoeing smiths, and others who may be in a similar predicament, "machinery displaced labor," it is true; but what about that vast army of workmen which owes its existence to the invention of the electric motor, and finds profitable employment in its manufacture, operation, and repair?

We grant that in the case of those two hundred men the introduction of electricity worked a hardship which calls for universal sympathy; but, judged from the standpoint of humanity at large, weighed in the balances against that principle which seeks always "the greatest good of the greatest number," the loss of work by these men, deplorable as it was, is merely an accident in the onward progress of an invention which is bringing, and will continue to bring, work, good wage, and a host of the conveniences of life to millions of the human race.

Whatever local or temporary hardship the introduction of improved machinery may work, its ultimate effect is to vastly enlarge the fields of labor, continually opening new avenues of employment. For one class of work that it supersedes it creates a dozen others. It may be said that indirectly the inventor is the greatest of all employers of labor. It is to the joint co-operation of invention, capital and labor in the past that we owe the existence of those vast industries which have carried our country forward to its present proud position in the world of manufacture and commerce.

The interests of machinery and labor are so identical that it may be said without exaggeration that the vast improvement in the condition of the working classes which has taken place in the past half century is directly due to the progress of mechanical invention. Cheap food and clothing, improved dwellings, cheap literature, the penny paper, workmen's trains, enabling the laborer to live amid the refreshing surroundings of a suburban home, are a few among the blessings which have resulted directly or indirectly from the fostering of invention and the introduction of improved machinery. It is inevitable, as we have seen, that, in the readjustment of labor which follows the introduction of improved methods, some few individuals must occasionally suffer; but the compensation for the temporary suffering of the few is found in the permanently bettered condition of the vast majority.

Just now the country has fallen into the trough of that phenomenal wave of prosperity which passed over it from 1886 to 1892. The cause of the present depression lies very deep; too deep to be touched by any mere legislative act. It is to be found in certain immutable laws of supply and demand which operate (as we are now finding out) as resistlessly in the new world as they have done in the old. But whether the scarcity of employment be due to the scarcity of the demand for the product of labor or not, it may be written down once and forever that it is not now due, never was due, and never will be, to those triumphs of the inventor's mechanical skill the record of which forms one of the proudest chapters in the history of the United States.

The Canal Lock at Bremerhaven.

The new imperial harbor of Bremerhaven will soon be opened to the public, and a work will then have been completed which must be counted among the most important of its kind. The new harbor has been in course of construction since 1892. It will be protected from all sides by very strong levees against the frequent high flood tides of the North Sea, and will contain three large basins, which will be open during ordinary high tides, while at ebb tide the entire complex of basins and passages will be closed off by gigantic locks. Since the dimensions of steamships are continually growing, and the largest steamers of the North German Lloyd must be able to enter the new harbor, the entry had to be made large enough for all. The former inner harbor at this point was greatly increased in size, and a new entrance was built, which comprises, besides a strongly built dike over three-quarters of a mile long, the largest lock so far constructed. This lock will be kept closed whenever the water in the Weser River is lower than the depth of water to be maintained in the harbor. When open, the lock has a clear width of 91 feet, the gate being 38 feet high, the largest in the world. The length of the lock between the two gates is 700 feet, and at ordinary high tide there is a depth of water of 33 feet. The gates rest in two masonry structures built on caissons of 20 feet in height and solidly cemented to the ground. The building of these structures, which took place under very favorable conditions, has succeeded surprisingly well, considering that it is one of the most difficult technical problems. The entire construction rests upon pile work, the length of the piles varying from 50 to 70 feet. Most of the construction work was carried on during the ebb tide, recurring twice every twenty-four hours, so that only four hours a day could be employed at that work, and that only in favorable weather. What an immense amount of work was necessary to construct this harbor is evident from the following figures: Twenty thousand piles were sunk for a foundation, 45,000,000 cubic feet of soil had to be taken away on dry ground, and as much more dredged out by the immense dredges formerly used in the construction of the North Sea-Baltic Canal. At the entrance of the harbor 4,750,000 cubic feet of masonry were necessary to strengthen the dikes and hold the colossal locks. An immense dry dock has been built immediately adjoining the harbor, which will accommodate the largest vessels of the world, its dimensions being identical with that of the lock at the entrance of the harbor.—St. Louis Globe-Democrat.

AN International Exhibition of Gardening will be held at Hamburg, Germany, beginning next May. The exhibition will be kept open until September. It will comprise all branches of gardening and the cultivation of plants.

The Return of Lieut. Peary.

The steamer Hope, with Lieut. Peary and party, arrived at Sidney, Cape Breton, on September 26. In spite of the stormy summer season and a large amount of ice in Greenland waters, Mr. Peary and his party have returned with a good record of scientific work and with very large collections, although he was unable to secure the big meteorite of Melville Bay, which was one of the objects of the trip. After leaving Turnavik, Labrador, the Hope steamed north along the coast, encountering great quantities of heavy ice. The party obtained three polar bears, two of which were brought home securely tied in a large cage on the deck of the vessel. The Hope entered Hudson Strait and reached Ashe Inlet, on the north side, on July 25. After a call at a village of Hudson Bay Eskimos, the Hope forced a passage through the ice, rounded Resolution Island on July 29, and on July 30 attempted to enter Cumberland Sound, but was prevented by heavy ice. The vessel then made for Godhavn, Disco Island, Greenland, which was reached on August 2. Here magnetic observations were made. Calls were then made at Atanikerdluk, Omanak, Upernavik, Wilcox Head, and Melville Bay. At all these places various members of the party were landed to enable them to pursue their special lines of investigation. Melville Bay was crossed in twenty-six hours, and Cape York was reached on August 8. Here Lieut. Peary found that the few natives had been decimated by influenza and that his second house (Anniversary Lodge) in Northwest Greenland had been burned by the carelessness of an Eskimo witch. The eclipse of the sun was observed about midnight on August 30. The lower limb was obscured to an amount equal to one-fifth of the entire disk. The Hope then steamed northward, visiting various settlements, obtaining important casts, photographs and measurements, and gaining important additions to the collections. Heavy ice, which filled Smith Sound, prevented the steamer from reaching Cape Sabine.

The site of Polaris House, where a portion of the Hall expedition wintered, also Port Foulke, Dr. Hayes' winter quarters, was visited. On the return trip, Cape York was reached on August 23, and, though a landing was made, it was found impossible to remove the great meteorite with the hydraulic jacks, and the ice compelled them to retreat on September 4. Wilcox Head was reached on September 7, and Prof. Tarr and his party were embarked. Calls were then made at the other places where members of the expedition had been left to make studies or collections. The Niantilik whaling station was reached on September 17, and, after making magnetic and pendulum observations, collections, etc., this place was left on September 19, and the voyage to Sidney was made in seven days. The explorers found that last winter was exceptionally severe in Greenland.

The collections which will find a home in the American Museum of Natural History filled one hundred packing cases. The Cornell party under Prof. Tarr made interesting studies on a large double glacier, which they called Cornell glacier.

A pleasant surprise awaited Mr. Peary on his return home. Some time ago it was suggested by the Philadelphia Geographical Club that the great interior of North Greenland, which the sledging parties which he has led have alone explored, should bear his name. This suggestion was highly approved by foreign geographers, and hereafter the interior of North Greenland will be known as "Peary Land." This name will be most conspicuous on the map, owing to the size of the territory embraced, as he has explored a larger area of Greenland than has fallen to the lot of any other explorer. The land which Mr. Peary saw north of Greenland, and which is separated from it by a channel, is the most northern land known. The Fram drifted for many months in more northerly latitudes without seeing a particle of land. This channel has been named Peary Channel by Prof. Guido Cora, of Turin.

Geographers who believe that the great problem of the discovery of the pole may be attacked by following a coast line to the north will now probably advocate the Greenland route, as De Long, Nansen and Jackson have proved that the eastern part of the polar area has no coast line to be followed.

Mr. Astor's New Electric Launch.

John Jacob Astor's handsome new electric launch Utopian went off the ways from Ayer's ship yard, Upper Nyack, on September 10. The launch was not a perfect one, as the draw chain broke and left the bow on the ways, but after an hour's work she was floated all right.

The Utopian is one of three electric launches owned by Mr. Astor. Her cost will be from $18,000 to $20,000. She is a twin screw auxiliary launch, 72 feet over all, 12 feet beam, 3 feet 6 inches draught, and was designed by Charles D. Mosher. The motive power is electricity, and the boat will be driven by two 25 horse power motors, built by the Rick Electric Motor Company. She will also have auxiliary sail power. Mr. A. W. Johnson, electrical engineer, will have charge of all the batteries and the machinery in general. Mr. Astor will usually run the launch himself.

The boat will have a search light of from 1,000 to 10,000 candle power, and be lighted throughout by electricity. She was built to make sixteen miles an hour. Her first trip will be to Fern Cliff, at Rhinecliff, where the batteries will be placed at Mr. Astor's boat house, built for his electric launches.

The Sixty-fifth Exhibition of the American Institute.

The present exhibition of the American Institute, which was opened on Monday, September 28, is practically a revival of a series of famous annual exhibitions which were given continuously from 1828 to the year 1892. The American Institute of the City of New York, as it was called, was chartered with the avowed object:

"To encourage and promote domestic industry in this State and the United States in agriculture, commerce, manufactures and the arts, and any improvement made therein, by the bestowing of awards and other benefits on those who shall make such improvements or excel in any of said branches."

The first fair was held in 1828, in the old Masonic Hall on Broadway, near Pearl Street. Others took place in old Niblo's Garden from 1834 to 1845, at Castle Garden and the Battery, and at the Institute rooms in Cooper Union. In 1869 the Institute secured the Empire Skating Rink, on Third Avenue between Sixty-third and Sixty-fourth Streets, and from that year up to 1892 the fairs were held regularly in this building, which was widely known as the American Institute Hall.

In looking back over the records of the Institute one can say that they are a record of the growth of this country in the industrial arts and sciences. The subsequent fame and wealth which their inventions brought to the winners of the Institute's medals are proof of the discriminating judgment with which the awards were made. Among the early winners of medals were the sewing machine, the many-chambered cylinder rifles of Samuel Colt, and Richard M. Hoe's type revolving press. The first anthracite coal burning stove of Dr. Nott was first given notoriety by the American Institute. Morse made one of the earliest exhibitions of his telegraph at the Niblo's Garden Fair. The gold medal was awarded to the inventor of the stocking loom in the early days of its introduction, and the telephone was first shown to the public in the Third Avenue building. As far back as 1839 a gold medal was given to Joseph Francis for the invention of the lifeboat. Naval architecture, as was fitting in the chief seaport of the country, always received liberal encouragement, and in 1851 George Steers was given a gold medal for the model of his famous yacht America, which brought home the much contested cup from English waters.

It is thus that "the hopes of its projectors have been realized in its giving substantial aid in the development of the products of American industry. It is not a moneymaking institution, has no stockholders, is governed by its board of trustees, pays taxes on its property, has but a limited appropriation from the State as the Agricultural Society of the County of New York, and is accountable to the State for all it does, for all that it holds and owns."

The present reading rooms and library of the Institute are located in West Thirty-eighth Street. Here the various sections hold the regular meetings. They comprise the Farmers' Club, under the direction of the Committee on Agriculture; the Polytechnic, under the direction of the Committee on Manufacture and Machinery, which discusses scientific subjects and examinations of new inventions, etc., and is really the Mechanics' Club of the old days under a new name; the Photographical Section, under the direction of the Committee on Chemistry and Optics; and the Electrical Section, under the direction of the Committee on Electricity, are all part of the working of the American Institute, with their meetings held regularly, and the discussions open to every one interested in advancement and education.

From 1892, when the Third Avenue building was torn down, to the present year there has been no exhibition; but this year, through the efforts of Mr. Charles Chamberlain, Director of the Institute, it was decided to engage Madison Square Garden for all of October and "to take up the lines where they were dropped in 1892."

The miscellaneous part of the exhibit is housed on the main floor, and below, on the machinery floor, will be found the heavier machinery. On this floor is a very complete exhibit made under the auspices of the Paper Digest Company, showing the whole process of getting out a paper. It comprises first a Mergenthaler typesetting machine, then, in their order, a self-feeding printing press by the Whitelock Machine Company, driven by a two horse power electric motor direct connected to the driving shaft, a folding machine, a cutting machine, a wire stitcher, and lastly a mailing and self-addressing machine. On the main floor above there is in operation a rapid press for printing cards, tags, or envelopes which has a speed of from 5,000 to 12,000 an hour. It was built by the Harris Automatic Press Company, Niles, Ohio. One of the most complete exhibits is that of Watson & Stillman, on the machinery floor. It comprises a large assortment of hydraulic jacks, rail benders, crank pin presses, die sinking presses, punches and shears. Near by is a large collection of split friction clutch pulleys and couplings, shown by the Dodge Manufacturing Company. Owners of small launches will be interested in a small Vogel steam engine built by Charles Vogel, Fort Lee, N. J. It is entirely incased, only part of the main and valve shafts being visible. It contains three cylinders and one rotary valve, and weighs 240 pounds for 5 horse power. It measures 12 inches by 24 inches by 12 inches high. The Otto gas engine is represented by four horizontal and two vertical engines, the latter designed for marine work. They range from thirty-six horse power to four horse power and show the usual high finish of these machines.

Perhaps the most novel and interesting exhibit on this floor is that of the Montgomery fiber-saving cotton gin, which is shown in operation. It is claimed that the fault of the Whitney saw gin, one of which is shown alongside the new invention, is that the teeth of the saw, in separating the cotton from the seed, tear it to pieces, and spoil the quality of the fiber, taking out the twist. In the new machine the cotton is caught by a leather covered ginning roller, and drawn downward by two small rollers over a fixed edge, on which the seed is pressed out of the boll. This operation is effected without breaking the fiber of the cotton, which is considerably longer than that turned out of the old form of gin.

On the main floor will be found a compact exhibit by the Daimler Motor Company, which will repay a careful inspection. It includes gasoline, gas and kerosene motors, a four-seated horseless carriage of very handsome appearance, and a railroad inspection car. This has two seats, one in front for the inspectors, and a rear seat for the engineer. Beneath the rear seat is the box containing the motor, and on either side of the motor is a cylindrical tank for the gasoline and water. It can be driven from 7 to 15 miles an hour, a higher speed not being necessary in the work of inspection.

Near by is shown an ingenious application of electricity in the Empire selflighting oil lamp. Beneath the base of a parlor lamp are two small dry batteries, and the wires are carried up to a small platinum coil within and near the top edge of the circular wick. By pressing the button the lamp is lit without removing the shade.

The process of manufacturing a silk handkerchief may be seen in an R. T. Brooks silk loom, and a set of sewing machines can be seen at work on fur and sealskin sewing. They show the same excellent finish which characterizes the sewing machine in general. There are six machines in the exhibit, and they are known as Excelsior Nos. 1 and 2 and the Columbia robe machine for heavy fur sewing. Here is also the tail twisting or spinning machine, and the pique prix seam Brosser glove machine.

The bicycle industry is represented by but one make of machine, the Humber. The machines are fitted with the plunger brake, direct through the head, and are similar to the English machine of the same name, with the exception of the pedals and cranks, which are round instead of flat, and the sprocket.

The A. A. Griffing Iron Company have a fine show of Bundy sectional, tubular, hot water heaters, and Bundy oil and steam separators, together with a wide variety of radiators.

An excellent exhibit is made by the H. W. Johns Manufacturing Company, of New York. The varied uses to which that most useful substance, asbestos, has been put is here shown in an extremely interesting stand. There is asbestic wall plaster—soundproof, fireproof, and a regulator of temperature; asbestos pipe and boiler covering; fireproof roof covering; electric asbestos pads for bed warming. Woven asbestos is shown made up into a complete fireman's suit, and the same fabric is worked up into gloves and boots for glass blowers, iron workers, and foundrymen, to protect them from heat and flying metal.

Photography is represented by Dana and Wurst, the latter showing some remarkable bass relief carbonettes, in which the lights and shadows of the photograph are accentuated by embossing or raising the figure.

No exhibition is complete in these days without its share of phonographic and similar displays, and the Columbia Phonograph Company shows in operation the graphophone, phantoscope, and kinetoscope.

The display of gas outfits for hotel and domestic use by William M. Crane & Company, of 838 Broadway, New York, is carefully prepared and elaborate. The Gas Engine and Power Company, of Morris Heights, New York City, show one of their well known twenty-five foot naphtha launches.

Suburban residents who are struggling with the problem of a lawn mower that won't mow should visit the stand of the Pastime Lawn Mower Company, where some most ingenious and practical improvements in these useful machines are embodied in a compact and novel mower.