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1876, can be supplied; subscriptions date with No. 1 unless otherwise or dered.

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35 of nickel, 25 of brass, 20 of tin, and 10 of zinc. Articles in 1752 that he demonstrated the identity of lightning with Robert Hare, of Philadelphia, one of the greatest as well as made from this are plunged white hot into a mixture of 6 the electric spark, and drew electricity from the clouds. the earliest of American scientists. It occurred to him that parts sulphuric acid, 10 of nitric acid, 5 of muriatic acid,

AMERICAN PROGRESS---I.---FROM 1776 TO 1820.

recount the condition of the thirteen colonies of North Amer- and a framer of the Declaration were not sufficient to distract ica during the months just previous to the adoption of the his attention from Science; and when sent as Commissioner Declaration of Independence. A year had elapsed since arms to Paris, he took advantage of the voyage to make observahad been taken up against the mother country; and although the colonists had resisted successfully, the very fact carried fresh terror to the doubting, for it augured invasion, not by a few battalions sent to quell a rebellious mob, but by the delphia, may be noted beside that of Franklin, whom he grand armies of England, victors in a century of wars. If succeeded as President of the American Philosophical not extirpation, then reduction beneath a tyranny, more grinding than that against which they had revolted, now fection of his art into the manufacture of orreries, which menaced the rebels. Congress sat doubting, distrustful, divided in thought, seeing no glimmer of light in the prevailing darkness, thinking, as John Adams moved on the 10th of May, 1776, that the colonies should themselves establish separate governments, "adequate to the exigencies." But the stirring eloquence of Thomas Paine was ringing through the land, replete with the suggestion of a hope which none had dared to cherish. The war against England's blind and headlong oppression was fast becoming, through popular sentiment alone, a war against England herself; and it needed but the formal declaration of Congress to elevate the lowed, and private confidence fell in the wreck of public conflict from a mere rebellion to that grandest of wars, which finds its parallel in all animate nature, the struggle for national existence.

To turn from the political to the industrial condition of the fragility of the foundation on which the fabric of our nor woolen nor fiax manufactories: all were suppressed by lowed the production of pig iron; but the colonist was forced called into action. to have the material manufactured in England, and pay an

the Newcomen type. No agricultural machines were known, of inventions becomes visible. except, perhaps, the grain drill, no cotton mills existed, and vantage ground for the invader.

British army was preparing to attack New York, while all 000,000 to 215,000,000 lbs. the seaboard cities seemed doomed to certain and swift dedence was proclaimed, and the nation was born.

out the land." Much must necessarily be omitted; of nothing can we take more than a passing glance, so vast and and the conservation of energy. varied are the achievements which, beyond all else, have remember that in the very restrictions placed upon their ef- Robert McKean patented the first steam sawmill. forts toward progress were found the impelling causes of the war of independence.

progress up to the close of the conflict is meager in the ex- imports, and during the previous decade 306 patents had treme. The discoveries of Franklin, the first great contribu-A NEW white un-oxidizing alloy is made of 10 parts iron, tions of the New World to Science, had all been made; it was Early in 1775 he left England, where he had been hon- a flame produced by the combustion of oxygen and hydrogee ored and courted, and returned to bide his fortunes with gases ought to be attended with a higher heat than that gnn

his native country; but even the engrossing labors im There are few darker pages in history than those which posed upon him as a member of the Continental Congress tions of the Gulf Stream and to plot a chart of that great current, which still forms the basis of our maps.

One other name, that of David Rittenhouse. of Phila-Society. Rittenhouse was a clockmaker, and carried the perstill exist, and which show the movements of the heavenly bodies for a period of 5,000 years, and their positions for each year, month, day, and hour, with marvelous accuracy. He made a successful observation of the transit of Venus in 1769, and on account of his great mathematical attainments was elected a Fellow of the British Royal Society.

After peace had been declared, the country found itself ex hausted in resources and in men as well, and saddled with a debt of forty million dollars, with no system of public revenue wherewith to provide for it. Financial disaster folfaith. It was no time to await the slow development of events, and the people recognized the fact. It seemed as if every one worked with a will. The whir of the spinning wheel and creak of the loom were heard all over the land. the colonies is but to bring to view fresh evidences to show Every family became a manufacturing society. In 1784 New Jersey alone had forty-one fulling mills for woolen fabrics, country was reared. Iron and steel works there were none, and not a woolen factory in the State. In two counties in Virginia, 315,000 yards of fiaxen cloth, 45,000 yards of wool-England. Iron founderies had been started, and in New Eng- en, 30,000 yards of cotton, and 45,000 of linsey woolsey were land hats had been made; but Parliament declared America made in one year by household labor. One family completed factories "a nuisance," and crushed them ruthlessly. It al- 1,355 pair of shoes in a year. The inventor's skill was quickly

In 1785 Oliver Evans, of Philadelphia, first applied steam enormous profit to the English founder. Agriculture, hunt- machinery to the grinding of plaster and sawing of stone, ing, fishing, and cutting lumber, England could not check; and to flour mills. Then he invented the elevator or bucket hence these furnished occupations to those who were not chain to raise grain, the conveyer to take it from place engaged in such few trades as were carried on. Probably to place, the hopper boy to spread it, the drill to carry it the most extensive factory in the country was Baron Stiegel's by rakes instead of buckets, and the kiln dryer. In 1799 he glass house, in Mannheim, near Lancaster, Pa. Operations attempted to build a steam carriage, and in so doing invented were conducted in a curious manner, for the owner's ideas and constructed the first high pressure steam engine. In were of the feudal ages. He built castles and mounted can- 1785 John Fitch built the first steamboat, and ran it on the non wherewith to salute himself on arriving and departing; Delaware river. It had reciprocating paddles, and steamed and when a guest was received, the workmen were sum- at the rate of eighty miles per day. During the succeeding moned from furnace and foundery to attend the new comer year James Rumsey propelled a boat on the Potomac by a with music and rejoicing. The war cut off the Baron's funds stream of water driven out through the stern by a steam enfrom Europe, and the works were soon after discontinued. | gine. In 1790 Jacob Perkins, of Massachusetts, invented a Shipbuilding existed in New England, and brick-making machine for cutting and heading nails, which produced those in nearly all the colonies. There were but two steam en- useful articles at the unprecedented rate of 200,000 a day. On gines in the territory; one built in 1772, for use in a distillery the 31st of July, 1790, the first United States patent was isin Philadelphia; the other had been imported in 1736, for sued, the patent and copyright laws being both first enacted the Schuyler copper mines, at Passaic, N. J. Both were of in that year; and thereafter a marked increase in the number

At this period, the growing cotton industry of the country the green seed or staple cotton alone was cultivated. Not seemed to have encountered an obstacle, which bid fair to a printing press existed west of the Alleghanies; and there be a serious one. Hand-cleaning of cotton was slow and were only forty, all hand machines of the crudest type, in the costly; and unless mechanical means could be devised, the colonies. Thirty-seven newspapers sufficed to spread in- new staple could never become a source of wealth. It so telligence. From Boston to New York was a week's journey happened that there then came to the house of Mrs. General by coach, sloops plied between New York and Albany; and Greene a poor student, from Yale College, named Eli in winter, colonists in Virginia were practically isolated from Whitney, who, in various ways, showed himself possessed those in Massachusetts. Certainly no nation ever embarked of considerable mechanical skill. While some officers, her in so gigantic a struggle worse prepared; for of the material guests, where one day regretting the absence of the machine prosperity whence the sinews of war are drawn, the colonies above noted, Mrs. Green laughingly suggested that Whitney were destitute. Canada, refusing to join them, furnished should invent one. The young man overheard the words and remembered them. He had never seen cotton in his The Spaniards along the Mississippi looked with no favor life; but making his way to Savannah, he obtained a small on the rebellion, and the English in Florida were actively quantity and, shutting himself up in a room, went to work. hostile. Thus on the 10th day of May, 1776, just one hundred It is said that the saw gin was suggested to him by the years before the opening day of the Centennial, the few but accidental use of a toothpick to try the tenacity of the seed. resolute inhabitants of the thirteen colonies found them. Within ten days after he began experimenting, he made a selves hemmed around with foes, bankrupt in money and model which was capable of cleaning 50 lbs, of green in industries wherewith to gain it, menaced by an uprising seed cotton daily. Thus was completed one of the greatest among the Indians on the border wildernesses, disunited in inventions of modern times, and one which the inventor lived thought and feeling among themselves; and to crown all, a to see result in increasing the cotton production from 5,

In 1796 the great scientific discovery of the non-materistruction. Yet, in the face of these terrible odds, Indepen- ality of heat was made by an American, Benjamin Thompson, Count Rumford, then residing in Munich. He had de-It is our purpose to present here some brief account of serted his country during the war, and accepted service what Americans have accomplished in Science and invention under a foreign prince. This discovery lies at the foundasince the bell in Philadelphia pealed forth "liberty through-tion of the mechanical theory of heat, and directly led to the grandest doctrines of modern Science, the correlation of for

We may note the establishment of broom-making as a combined to create a great and powerful nation in the new industry, and the invention of broom-making machinery shortest period known to history. To the same ancestry in 1797, by the Shakers located along the Mohawk river. In that asserted their rights as freeborn men, an ancestry the same year Amos Whittemore, of Massachusetts, devised gathered from the skillful workers of all countries, are due the first machine for the manufacture of wool and cotton the frugal and industrious habits, the facility of adopting cards; this device punctured the leather and set the wires. means to ends, and the indomitable perseverance and energy This proved of great value to the industry, and highly re which characterize the American people; and it is well to munerative to the inventor. During the following year

At the opening of the nineteenth century the signs of remarkable progress were everywhere discernible. In ten years The industries of the country being practically ruined the population had increased by nearly two millions. The when the war began, the record of invention and scientific exports for 1799 were \$78,665,522 against \$79,069,148 been granted.

In 1801, the oxyhydrogen blowpipe was invented by Dr.

erated by burning charcoal. But the two gases mingled in certain proportion produced a dangerous explosive mixture, storing the gases in separate vessels, and bringing them together by tubes which met at the point of ignition.

stern paddlewheel boat on the Delaware and Schuylkill the best entomological authority in the country. rivers. This was driven by a double action high pressure engine-the first of its kind-which rotated wheels when vented a machine which made 500 tacks per minute, with moisture, which dissolves the glutinous substance which ing regulations. We allude elsewhere to its action in closing perfectly finished heads and points. Soon after, he devised normally protects and hold them together. In some parts of length by one self-directing operation. This was the initial ward the north, eggs have been deposited in numbers by the magnificent invention of the lathe for turning irregular tated last spring; but in that region, such is the case every tions of the weapon.

to Albany. Fulton at that time was already an inventor of protracted rains have destroyed the eggs. repute, both in England and in the United States. He had successfully tried, probably, the first submarine torpedo boat. mer will enjoy the greater immunity during the same seacountry from England. Here he received a congressional juries of obnoxious insects, except the wood borers. In appropriation, and made some successful experiments in short, the people of the ravaged section have every reason blowing up vessels; but ultimately Commodore Rodgers re- | to be hopeful rather than gloomy. ported the system impracticable. Later, he obtained the exclusive right to navigate the Hudson river in his steam vessels. In 1814, Fulton built for the United States government the first steam war vessel, a heavy and unwieldy mass, al Board of Fire Underwriters, delivered before that body at capable of making about 2½ miles perhour. The war of 1812, in its recent session in this city, contains many useful suggeswhich she was designed to be used, terminated before her tions relative to fireproof building, which, however, here at completion. Fulton died during the construction of the least, appear to be "more honored in the breach than in

Donelson in 1862.

selling them rocks for fuel.

During the war of 1812 but very few military inventions same description in New York city. appear. Probably the most important was the columbiad, a long-chambered cannon capable of projecting shot and shell at ings alone saved Paris from destruction at the hands of the high angles and with heavy charges. It was devised by the communists; and he states that he witnessed the burn-Colonel Bomford. In 1813, Francis C. Lowell invented numering of entire floors in houses, involving the destruction of ous important improvements in the power loom, notably the everything in them, without perceptible damage to the stories stop motion for winding on the beams for dressing, and the of the same building either above or below those burned. double speeder to regulate the movements of the fix frame. The percentages of losses paid to premiums received in filling the spools. The first important American improve. gregates 47:16 per cent for 1875 against 42:50 per cent for ment in printing presses appeared in 1817, and was the 1874. The loss rate for the first three months of the pre-Columbian press, invented by George Clymer of Phila. sent year is largely in excess of the like period in 1875; and delphia. The power was applied to the platform by a com- generally speaking, Mr. Oakley considers that the outlook pound lever consisting of three simple levers of the second for the insurance business is not good. He further says that, order. The first transatiantic voyage made by a steam despite all the modern appliances for the prevention of fires, vessel was accomplished by the Savannah in 1819. The the fact still remains that there is a steady increase in their vessel was of 380 tuns burden, and was driven by paddles. number, and from causes too often within the control of the In the year last mentioned, Jacob Perkins invented engraviousness or occupants of the property. We pointed out this, ing on steel as a substitute for copper.

commerce of the country passed through a season of terrible excite the question as to whether, after all, insurance is stagnation, owing to the orders in council of England and not more injurious than beneficial to the community. The in order that every one may visit the Exposition at a com-Napoleon's Berlin and Milan decrees. In 1808, imports carelessness on the part of owners, of which Mr. Oakley paratively small expenditure. fell off to \$56,990,000 and exports to \$22,430,590. This decomplains, seems to us the legitimate consequence of the cline continued to 1814, when an extraordinary impulse was risk of loss being taken off their shoulders; and for the monies will have taken place, and the long-looked-for Cengiven to trade, and imports went up to amounts excessive same reason, they have little interest in availing themselves of the wants of the country. Subsequently, the average of of the many new and useful inventions to protect their imports and exports remained uniform at about \$78.000,000. property. From 1800 to 1810, only 1,086 patents were allowed; and from 1800 to 1,820, 1,748. The population of the country and adjacent property been imperiled, merely to obtain inhad, however, increased to 9,638,131, and with it the number surance money; and certainly few edifices are better adapted and extent of manufacturing industries augmented, thus to the practice of this crime than those of the type which we providing for the season of renewed prosperity which fol- have above referred to, the almost certain destruction of

The rapid growth of this country in population, wealth, and culture since the year 1820 is now a just cause for pride ciated in value, such incendiarism might well be most prevaand congratulation; and in our next two issues, we shall note; lent; and this is in significant accordance with Mr. Oakley's the prominent incidents in this interesting and important further statement as to the recent steady increase in num-

THE GRASSHOPPER SCOURGE OF 1876.

and Dr. Hare was thus led to adopting the expedient of Professor C. V. Riley's recent statements, in the Colorado be nearly complete on the opening day. Nine tenths of all Farmer, relative to the probable numbers of the grasshop- the exhibits are in place, and there is every indication that pers during the coming summer. Some one, it appears, has every department will be further advanced than has been Now followed one of the most important advances in asserted that the soil of the region in the northwest portion the case on the first day of any previous World's Fair. steam navigation, although the fact was not recognized for of the country lying east of the Rocky Mountains is cov- Machinery, Agricultural, and Horticultural Halls will be years after. It was the practical demonstration of the efficacy ered with prodigious numbers of grasshopper eggs; and this filled; and from the rapid manner in which the work is now of the screw propeller, by Colonel John Stevens of Hoboken, disagreeable announcement has gone the rounds of the press, progressing, it appears that the Art Department will likewho in 1804 built a boat containing a Watt engine, a tubular through the length and breadth of the land. Professor Riley wise be in readiness. The condition of affairs at the present boiler of his own invention, and the bladed screw. It was a gives it its quietus in so characteristically effective a manner time is in marked contrast with the disorder prevalent two pirogue some fifty feet long. The machine itself is still in that we are half inclined to be grateful to the mendacious weeks ago; and the wonderful celerity with which the thouexistence, and was illustrated in these columns some time individual who set the story affoat, since it has been the sands of contributions have been arranged is another instance ago. During the same year, Oliver Evans ran an amphibious, means of obtaining such welcome intelligence from probably

From personal observation, Professor Riley states, so far in incredibly short periods of time. as Missouri and Kansas are concerned, the report is wholly the craft was ashore, and operated the stern paddle when groundless. In Minnesota, a State commission has deteraficat. In 1806, Thomas Blanchard, of Massachusetts, in mined that the eggs have mostly perished from excess of an apparatus for turning gun barrels throughout their entire the high country lying east of the mountains, especially towork which culminated, twenty two years later, in the swarms which left the lower and more fertile country devasforms. Blanchard's inventions are now applied to many year, for it is the native home of the swarms which occaoperations in making musket stocks, and comprise no less sionally extend to the upper Mississippi valley. In Missouthan thirteen different machines for making different por-ri, Kansas, and Nebraska, however, the number of eggs, laid by the few straggling insects that passed over those States The following year, 1807, witnessed the triumphal voyage last fall, will not equal that laid in ordinary seasons by in- in the jury arrangements, we notice, have already been of Robert Fulton's steamer, the Clermont, from New York digenous species. In Colorado there is every hope that the made. Owing to the immense number of applications for

Professor Riley gives it as his conclusion, in addition to devised a mill for sawing marble, machines for spinning the above, that, compared with other parts of the country, fiax and making ropes, an excavator for canals, and he had those States ravaged by locusts in last spring and early sum-It was in relation to the latter that he returned to this son of 1876, not only from locust injuries, but from the in-

FIRE INSURANCE.

The address of Mr. H. A. Oakley, President of the Nationthe observance;" and the speaker's impressions of European During the year 1807, oil cloth for floors was invented fireproof construction may well be contrasted with the way and manufactured in Philadelphia, and John Bedford of in which late edifices are built in this city. He remarked, the same city devised the first metal bound boots and shoes. he says, the universal use of concrete floors, of oak, and The first breech-loading military arms ever offered to troops, other hard woods instead of pine as finish, the entire separaand likewise the first fire arm made on the interchangeable tion of stories from each other, the absence of wooden or system, were invented by John H. Hall, of Massachusetts, in lath and plastered partitions, the solid backing given to the prove a great convenience to exhibitors and visitors. Krupp's 1811. Some of these old weapons were captured at Fort exterior of fronts, the thickness of division walls, the absence of wooden staircases, the isolation of flues from beams In 1812, anthracite coal was for the first time successfully or woodwork, the hight of the buildings (not exceeding sixty. utilized. It appears that Colonel George Shoemaker, of Potts-1 five feet), and the covering of the roofs with iron and slate ville, took nine wagon loads of the "black stones" to Phila- laid on beds of plaster. To compare this excellent resumé delphia, and there sold two wagon loads to Messrs. White & of what fireproof building ought to be with the filmsy af-Hazard, wire manufacturers. White and his firemen worked fairs built in this country is to adduce at once the reason of the faithfully for half a day, but the stones refused to burn; gigantic confiagrations with which even the best organized whereupon at noon they slammed the furnace doors shut in of fire departments are unable to cope. A building even disgust, and went to dinner. On their return the doors were now in process of erection on Broadway is exteriorly a mere red hot and the furnace in danger of melting. Meanwhile shell of thin iron which towers above the adjacent structhe Colonel had sold his other seven loads to less successful tures, while within it is a network of wooden beams and tion has been taken for the safety, comfort, happiness, and experimenters, and was by them arrested as a swindler for partitions, its present exposed skeleton showing no trace of pleasure of the public. The buildings of the Exhibition are fireproof fittings. There are many other structures of the

Mr. Oakley tells us that the solid character of its build-

The percentages of losses paid to premiums received agstate of affairs some time since as one of the disadvantages after the arrival of trains on all main lines, passengers can During the period from 1800 to 1820, just reviewed, the of the insurance system, disadvantages sufficiently great to be within the Centennial Buildings. There is a good pros-

Moreover, buildings have very often been burned, and life which effaces all evidence of the deed. It may be added yellow, owing to the liberation of iodine. If starch is present, that at the present time, when real estate has greatly depre-

There is cheering news for Western farmers, conveyed in ! Contrary to the general expectation, the Exposition will of that peculiar American characteristic which delays matters to the last moment, and then accomplishes herculean tasks

The Centennial Commission has likewise indulged in tardiness in disposing of some of the more important questions before it, and in making many material alterations in existthe Exposition and grounds on Sunday. The temperance question has recently been discussed, the point being whether to approve of the contracts, made by the Board of Finance, licensing the sale of intoxicating liquors in the grounds. The Commission arrived at no conclusion, and indefinitely postponed the whole subject, leaving the liquor men to sell their beverages under the concessions, and the temperance advocates to carry the matter, if they so elect, to the decision of another tribunal. Some important changes positions on the American Committee, some 4,000 in all, the names of appointees have been kept secret, and it is only lately that any of those who, it is desired, shall serve have been notified of the fact. The total number of jurors has been increased from 200 to 250; one half of the members are foreigners, to be chosen by the foreign commissioners, and the other half Americans. Ninety-six of the latter, we learn, have been selected, fifteen of whom are from New York, and fourteen from Pennsylvania, other States having a smaller representation. The pay of the American jurors has been reduced from \$1,000 to \$500, a proceeding of questionable wisdom, in view of the fact that elaborate professional reports are to be required, in lieu of medals or other more easily settled awards. There are not many experts who can afford the time and labor, which are involved in the careful examination and criticism of entries frequently during the coming six months, in return for a sum of money hardly sufficient to meet their necessary expenses. It would have been better to have abolished free passes, and increased the revenue in that way, than to have reduced the jurors' pay to such a small amount.

The Centennial Bank has been opened, and doubtless will 1.600 pounder cannon has been removed from the steamer and set up in the grounds, A magnificent series of industrial art productions has recently arrived from Italy; and a boat load of young alligators, from Florida, are disporting themselves in one of the ponds.

The President of the Commission has issued the final address, or rather invitation, to the public. He says:

"The sanitary condition of Philadelphia is good; rational amusements have been provided; arrangements for protection from fire, thieves, etc., are as nearly perfect as it is possible in a great city. Within the Exhibition every precauin order. The Exhibition will promptly open on May 10, and is an assured fact. All preparations have been made on a gigantic scale. Philadelph and her citizens have spent millions in preparation for the reception and care of guests. There is no disposition to nor evidence of extortion. Increased business at usual rates is considered sufficient compensation for the vast amount of capital and labor expended. Living is as cheap as, if not cheaper than, in any large city in America. The accommodations are unsurpassed. All grades of society can be accommodated. Railroad and transportation facilities are unequaled."

There is no doubt, it now appears, of Philadelphia being able to entertain, at reasonable prices, 150,000 and possibly 200,000 persons. The hotels will charge from \$5 to \$1.50 per day, boarding houses \$1 to \$2.50, and the Centennial Agency will provide breakfast, lodging, and supper for \$2.50. By steam and horse cars, 20,000 persons per hour can reach the Exposition from any part of Philadelphia. One minute pect of still further reductions to railway fares being made,

By the time our next number is issued, the opening ceretennial will be fairly under way. We shall give full descriptions of the proceedings; and when the various departments are in a condition to admit of proper examination of their contents, we shall make our readers acquainted with whatever seems to us novel and interesting.

A SOLUTION of iodide of potassium is slowly decomposed by the action of light; but when some cane sugar is added, it turns a blue color is produced. If a sheet of starched paper is soaked in a solution of iodide of potassium and sugar in the dark, and then exposed under a photographic negative to light, a blue positive print is obtained, which is fixed by washing in