MECHANICAL INVENTIONS.

Mr. Robert P. Dake, of Colby, Wis., has patented a hand power for driving light machinery, such as straw cutters, pumps, churns, grindstones, sawing machines, lathes, boats, and other light machines where other power is not attainable.

Mr. James B. Carlin, of Carthage, Mo., has patented a grain mill for grinding corn, oats, and other grains for feed for stock, and for other purposes where a coarse meal is required.

Mr. Benjamin C. Senton, of Whitehall, N. Y., has patented a propelling device especially adapted for propelling vessels in shallow waters and canals. The invention consists in reversing mechanism by which the paddle shaft may be turned, so that the paddles reverse their action.

Mr. John F. Mathews, of Stamford, Conn., has patented an improved dumping car for coal and other substances, so constructed that it can be dumped with ease and certainty, and readily readjusted to receive another load.

NEW PROTECTIVE SUIT FOR FIREMEN.

Several years ago a fireman's suit, invented by Oestberg, a Swede, was the object of considerable attention. It was made of felt, which was continually soaked with water, thus protecting the wearer from the effects of the flames and heat. The wearer was protected from suffocation by a supply of fresh air conducted to him through a flexible tube connected with an air pump.

The disadvantage of this suit was that the water and air had to be conducted to it through flexible tubes, and if the wearer was compelled to operate some distance from the pumps the dangers arising from entanglement or rupture of the tubes was so great as to render the apparatus impracticable in the majority of cases.

Mr. August Beyer, of New York city, recently obtained a patent for an improved fireman's suit, which is devoid of the imperfections of Oestberg's device. His suit is made of some thick fabric, serving as a nonconductor of heat, and has a lining of oil cloth, which is covered on the inner side with a layer of compressed wool impregnated with coal dust, mineral wool, or like material, and is protected on the outer side by a thick woolen fabric having a thick coating of a mixture of red ocher, glue, and sulphur. The metal helmet has a projecting part with a thick bullseye glass in front; from this projection a flexible tube, resembling an elephant's trunk, hangs down. The lower end of this trunk is provided with a perforated plate, which retains a quantity of small pieces of sponge, that cool the air as it passes through them and frees it from smoke. A spiral spring gives the trunk the required strength and prevents it from collapsing. A collar is attached to the bottom of the helmet, as is shown in dotted lines, and serves to connect the jacket and the helmet.

The heat of the fire evaporates the moisture of the wool in the inner lining and thus cools the body. The outer coating of the suit is fire and water proof, and blisters under the effects of the heat, but protects the inner layers.

The fresh coat of the ocher, glue, and sulphur paint is applied to the suit after use. A fireman provided with one of these suits can enter into the midst of the fire without suffering from the effects of the heat or smoke.

This device will be of great service in hotels and public buildings, and it is very valuable for private use, enabling its possessor to escape from a burning building in cases where it would otherwise be impossible. The inventor informs us that it has been subjected to severe tests and has proved efficient in every case.

Further information may be obtained by addressing the inventor, Mr. Aug. Beyer, 149 Avenue B, New York city.

BEYER'S PROTECTIVE SUIT FOR FIREMEN.

A Blind Man Climbs Mont Blanc.

That a blind man should undertake to climb the highest peak in Europe would seem at first sight to be about as useless and foolhardy an undertaking as could well be conceived. It appears, however, from the mountain climber's own account to have been a fair climb, pluckily undertaken and manfully carried out for a reasonable purpose. The climber, Mr. F. J. Campbell, of the Royal Normal College for the Blind, has devoted his life to the elevation of the condition of his sightless countrymen, and he finds that in order to carry on his work it is necessary to keep up his pluck, energy, and determination by all sorts of athletic efforts. Skating, swimming, rowing, riding, have contributed their share to this end, and last year he went to Switzerland to try mountain climbing. He went again this year, ending with the ascent of Mont Blanc, a task that taxes the capacity and all the powers of those who have no lack of human faculties and can enjoy by sight the grand views which the mountain summit offers as a reward for the hazardous undertaking.

Practical Suggestions on Stuffing.

If hair is confined, and the curl taken out of it by the use of the stuffing stick or wire, it has no power to act, as curled hair is intended to do; the life is twisted out of it with the stuffing stick; it lies dead, and we have to keep pushing more in to fill up the space between the tufts, so when the square or diamond is finished, it contains one-third more hair than it would if the stuffing stick had not been used. The job also is lumpy and heavy, and in a short time the cloth becomes loose by the settling of the hair, for the power to act has been taken out of it. If the tuft cords were cut and the cloth removed, the little ball of hair would scatter over the bench like so many walnuts. Now, if the hair had been laid, and the cloth tufted down through it, it would not do this, for the hair would be just as lively as when taken from the bag. We here give two practical ways to stuff a cushion.

A good cushion can be stuffed up in this way: Make the top up on a frame—lay the hair—and in sewing it to the facings, leave the back part open from corner to corner. Take sheeting or muslin, and make a pad one inch larger all round than the cushion facing and one inch thicker; fill the pad full of good hair—not with the stuffing stick, but with the hand—in the same manner that a mattress is filled; sew up the mouth, and quilt edge, bottom, and top, and also through the middle, with coarse shoe thread; fasten the cushion on the bench and fill the two front corners with cotton, and force the pad into the cushion. If not full enough, lay hair on top of the pad, and while sewing the mouth up, lay a little hair between the pad and facing; draw in tufts level with the top of facing. A cushion stuffed in this way must be comfortable to sit on, and it will keep its shape if the pad is properly filled and quilted; all with no thanks to our venerable stuffing stick.

Another way, and one that is quick for stuffing a cushion, is: Make the cushion with plain top, and when ready to stuff, fasten it on the bench, leaving mouth large enough to get the arm in. Commence filling the top first, using the hand. When a few layers are in, go to the bottom and fill that in the same way, but keep the top stuffing ahead. Continue this until the cushion is filled. It may be that the stuffing wire will be needed at the back corners, but only there. This is a much quicker and smoother way of filling a cushion than the old method.—*The Carriage Monthly.*

The Oregon Salmon Fisheries.

From the annual report of the Oregon Board of Trade we learn that the salmon catch of the past spring and summer has exceeded anticipations, yielding 530,000 cases. In 1875 a catch of 231,500 cases was considered enormous; 1877 yielded 400,000 cases, and 1879 as many as 435,000 cases. This rapid increase shows the vast extent and financial value of the Oregon salmon fisheries. Of the half million and more cases packed this year, 211,522 cases were sent to San Francisco, and 239,241 cases were shipped direct to Great Britain.

Growth of Inventions.

"Confound those ancients, they always get hold of one's best ideas." As it has been found in literature so in science, and the disappointed inventor, tumbling for the twentieth time over an anticipation of his cherished scheme, is tempted to redeclare that there is "nothing new under the sun," and that all is vanity and vexation of spirit. We give a few interesting examples of clear theoretical, if unpracticable, anticipations of a notable modern discovery.

Professor Stanley Jevons, ten years ago, found allusions to a magnetic telegraph running through many scientific or quasi-scientific works of the sixteenth and seventeeth centuries. The poet Addison speaks of "a chimerical correspondence between two friends by the help of a loadstone." Sir Thomas Browne, in his "Pseudodoxia Epidemica," says: "The conceit is excellent, and if the effect would follow, somewhat divine;" and he speaks of it as a conceit "whispered thorow the world with some attention, credulous and vulgar auditors readily believing it, and more judicious and distinctive heads not altogether rejecting it." Sir Thomas, it would seem, submitted the matter to experiment, but found that although the needles were separated but half a span, when one was moved the other would stand like Hercules' pillars. Joseph Granville, in his "Scepsis Scientifica" (1665), discusses the objections of Sir Thomas Browne, and concludes that "there are some hints in natural operation that give us probability that is feasible." Glanvill, more than 200 years ago, said: "Though this pretty contrivance possibly may not yet answer the expectation of inquisitive experiment, yet 'tis no despicable item that by some other such way of magnetic efficiency it may hereafter with success be attempted, when magical history shall be enlarged by riper inspections; and 'tis not unlikely but that present discoveries might be improved to the performance." The earliest book in which Mr. Jevons found allusions to a magnetic telegraph is the "Natural Magic" of Baptista Porta, published in 1589. In the seventh book he describes the "wonders of the magnet," saying in the preface, "I do not fear that with a long absent friend, even though he be confined by prison walls, we can communicate what we wish by means of two compass needles circumscribed with an alphabet." In the eighteenth chapter of the same book he describes the experiment of putting a magnet under a table, and moving thereby a needle above the table. This experiment, as Porta remarks, was known to St. Augustine, and an exact description will be found in his "De Civitate Dei," a work believed to have been begun A.D. 413. It seems probable that this passage in St. Augustine suggested the notion either to Porta, Bembo, or some early Italian writer, and that thus it came to be, as Sir Thomas Browne says, "whispered thorow the world." Mr. William E. A. Axon refers to the passage in Strada, in which he supposes the loadstone to have such virtue that "if two needles be touched with it, and then balanced on separate pivots, and the one be turned in a particular direction, the other will sympathetically move parallel to it. He then directs each of these needles to be poised and mounted on a dial having the letters of the alphabet arranged around it. Accordingly, if one person has one of the dials, and another the other, by a ittle prearrangement as to details, a correspondence can be maintained between them at any distance by simply pointing the needles to the letters of the required words."—*Design and Work.*

An Automatic Fire Extinguisher.

An engineer in the Brooklyn Fire Department has invented an automatic fire extinguisher, which was recently tested as follows: An experimental shed was half filled with barrels of shavings and chips. Near the roof was an iron pipe for the conveyance of water, to the end of which was attached a bulb perforated with numerous holes. In the center of the bulb was a cartridge, held in position inside a plug, to prevent the water from flowing, and on the outer side was a telegraphic attachment. The inflammable material having been lighted, in thirty-five seconds the fuse of the cartridge became ignited, resulting in the explosion of the cartridge. This released the plug in the bulb, allowing the water free course, and at the same time released the telegraphic attachment and sounded an alarm on an instrument at a distance. The experiment was in every way satisfactory, as the fire was extinguished without damage to the shed.

The Baking Powder Controversy.

Shortly after the publication in this paper of the valuable report on alum in baking powders, by Dr. Henry A. Mott, Jr., a bitter attack upon Dr. Mott's professional character was made by the editor of the *Spice Mill*. Suit for damages for libel was brought by Dr. Mott, in the Superior Court of this city, and a verdict in his favor was given October 16. The damages awarded were $8,000, to which the court added an allowance of $150.

Improvements in Fire Hose.

In nothing connected with the fire service has there been greater improvement during the past ten years than in the manufacture of fire hose. In the old days of hand engines, there was scarcely anything but leather hose used. Occasionally a department would buy sewed canvas or linen hose, but nearly all those used was made of leather. With the advent of the steam engine and higher water pressures, came a demand for hose of greater strength than leather. Out of this demand grew rubber hose, which is made of cotton fabric, coated with rubber. By using several plies of cotton, hose of sufficient strength was obtained. Then some one conceived the idea of dispensing with the rubber, and making fire hose entirely of cotton, woven in a cylindrical form, having no seam, either sewed or riveted. The old leather hose was equal to the pressure obtained with hand engines, but, when new, the manufacturers would not guarantee it to stand 200 pounds pressure, and by constant use its power of resistance rapidly decreased. The rubber and cotton hose now made for fire service is usually warranted to stand a pressure of 400 pounds, and is guaranteed to last three years. Often the water pressure at tests is run up much beyond 400 pounds, and the term of serviceability far exceeds the guarantee. We have seen sewed cotton hose now in service that was purchased twenty years ago, and rubber hose that has seen over ten years' service, and is still in use. But it is not the capacity to resist pressure that is evidence of enduring quality. Hose may be constructed to resist 700 or 800 pounds pressure, yet be so deficient in wearing surface as to last but a short time. What is required in hose is lightness, strength, and durabilty. Hose that will stand a pressure of 200 pounds, having a surface that is well protected and durable, is better than hose that will stand 700 pounds pressure, yet having a surface that is not likely to resist the wear and tear of street service.

Few persons comparatively have an adequate idea of what it has cost manufacturers to bring the construction of hose to its present point of perfection. We were recently shown a piece of cotton hose about one foot long, woven cylindrical, which, we were informed, had cost $15,000. That is to say, an inventor had spent years of his time and the sum named in perfecting a loom that would weave cylindrical seamless fabric suitable for fire hose. When he had produced the piece alluded to, he discovered that it would not do, but he had found the right way to do it at last, and his time and money had not been wasted. Many thousands of dollars have been expended in perfecting rubber hose and the machinery for its production. The manufacture of fire hose now constitutes an important American industry, requiring millions of dollars to conduct it, and giving employment to thousands of persons. It is an industry that is not adequately appreciated, even by those identified with the fire service. Firemen are wont to regard their apparatus with feelings of pride, and to boast of the achievements of their engines, while scarcely giving a thought to the hose, without which the engine would be valueless. Hose is not only a necessary part of the equipment of a fire department, but is usually the most costly. A steam fire engine will last for fifteen or twenty years, or longer, if carefully cared for, while hose necessarily wears out. The purchase of new hose year by year soon involves a city in an expenditure greater than the cost of apparatus. It is safe to say that if the hose in use in the fire service receives as good care as the apparatus, it would last much longer than it does. But the fact is, hose is regarded as rather an insignificant article: very necessary at a fire, but scarcely worth caring for afterwards. Even at a fire, it is generally treated with great roughness, trampled on by men and horses, and driven over by wagons and apparatus, and kicked about in a reckless manner. It is an easy matter to injure hose when under pressure, filled with flowing water, and strained to its full capacity. A slight blow will sometimes make an abrasion that results in a leak and a burst, destroying a length of hose worth in the neighborhood of $50. A little care and thoughtfulness on the part of the firemen would prevent such accidents. After hose has been used, it should be carefully dried and cleaned. To dry it, the best way is to suspend it at full length in a tower. It should *never* be hung up by the middle, as is too often done. Where it is bent over and allowed to hang, it is apt to develop a weakness afterward. Leather hose should be cared for as carefully as rubber, cotton, or linen. It is a common remark that leather hose requires no care. While it is true that leather hose will stand neglect better than any other kind, it is also true that it will repay care and attention quite as well as any other.

While there is a great diversity of opinion as to which hose is the best, and leather, rubber, cotton, and linen each has its champions, we, certainly, shall not extol one above another. Each has its place, and each has made a record for itself. Our purpose is to call the attention of officers of fire departments to the necessity of taking the best of care of their hose. First, always buy the best; examine and test all kinds, and, having decided which kind is best suited to your requirements, purchase the best quality of that kind that you can find; having secured your hose, take care of it as carefully as you would of a new steamer or hook and ladder truck. By so doing you will not only save yourselves much anxiety of mind when you are fighting fires, but you will save many a dollar to the taxpayers who support your departments. But, of all things, beware of cheap hose, and do not trust your reputations as firemen upon a line of hose that you have no confidence in. The bursting of hose at a fire may result in a serious calamity. If fire committees will persist in forcing cheap hose into the departments, the chief engineers should publicly protest against it and warn their fellow citizens of the danger to which they are exposed in consequence. With the abundance of good substantial hose that is now made, there is no excuse for any department being short of that article or having an inferior quality thrust upon them.—*Fireman's Journal.*

Jupiter's Satellite Seen Without a Glass.

Since the English shepherd reported to his master the curious sight wherein "a big star swallowed a little one," the larger satellites of Jupiter have more than once been seen with the unaided eye. Quite recently a lady of our acquaintance thus saw two of the great planet's moons and correctly described their positions with reference to their primary, the accuracy of the observation being verified by means of a telescope. The night was exceptionally clear, and the "seeing," as the astronomers express it, unusually good. The point of observation was near New York, and not more than two hundred feet above sea level.

At a recent meeting of the California Academy of Sciences there was read a communication from the president of the Academy, Professor George Davidson, describing what he terms an unmistakable case of seeing Jupiter's satellites with the unassisted eye, the second case which he has reported, the first being from Mount Diablo, Cal., in 1876.

Professor Davidson writes from the station Monticello, of the United States Coast and Geodetic Survey, 3,125 feet above the sea, the highest point of a sharp ridge overlooking Berryessa Valley on the west and the Sacramento Valley on the east.

He says: "For nearly a month the Sacramento and Coast Range valleys have been filled with dense smoke, and the distant mountain ranges have all been hidden. Even the bold, dark, grand mass of Mount Helena, distant but twenty-four miles, was barely visible through the thick atmosphere. The upper limit of the smoke stratum was quite sharply defined to the eastward; above it the sky was generally clear, but upon the present occasion only moderately so. The weather for some time had been warm and pleasant, without clouds or wind. On the early evening of Monday, September 20, we were looking at the obscured moon struggling through the dense smoke; Jupiter, at an estimated elevation of about 8 degrees, was emerging from it, and for an elevation of 25 to 30 degrees the whole sky was hazy, and stars of the fifth magnitude, and even some of the larger ones, were not visible to the naked eye. There was not the least radiation to Jupiter, and the planet rose through the smoky but quiet atmosphere into the thinner smoke or haze without radiant points of light to blur his appearance. With the unassisted eye Professor Davidson detected the third satellite of Jupiter, to the left and below the disk of the planet; but, lest he might be mistaken, he refrained from calling attention to it for some minutes, until there could be no possible mistake, when he announced the visibility of a satellite, but without stating its position in relation to the primary. All the officers immediately announced its visibility and position, but naturally wondered why it should be seen so unmistakably through such a thick, hazy atmosphere. A binocular, or good field glass, with magnifying power of seven diameters, revealed it, and also showed the other satellites on the side of the planet, but revealing the first and second satellites with difficulty, until the planet had risen somewhat higher. The third satellite continued visible to the naked eye for perhaps twenty minutes, when the moon rose above the smoke stratum, and the planet began to exhibit traces of radiation, when the satellite was lost to the naked eye, although all the satellites had become much brighter than before in the field of binocular. Upon subsequent nights, after the smoke had in great measure been blown away, with a remarkably clear sky and no moon, but with great radiation to the planet, no satellites have been surely made out with the unassisted vision. The observers who distinctly saw the satellites were Messrs. Lawson, Gilbert, and Buckland, and also Mrs. Davidson."

The Earth's Magnetism.

The great physical problem of terrestrial magnetism has engaged the attention of numerous physicists lately, and it is well known that several ingenious solutions of it have been propounded. Professors Ayrton and Perry, for example, conceived the happy thought that the earth was charged with static electricity, which being carried round on the surface by the diurnal rotation, acted like a circulating current and magnetized the core. A severe blow was dealt to this hypothesis, however, by the mathematical criticism of Professor Rowland, who pointed out that the surface charge required was competent to send a spark from earth to moon. A theory based upon the existence of electric currents flowing in the atmosphere around the earth was promulgated later; and now we have another supposition, which has a better claim to serious attention than any of the rest, because it is supported by direct experiment. Starting from the idea of M. Edlund that an electric current is really an ether current flowing in the circuit, and that electrostatic effects are due to rarefactions and condensations of the ether, M. Selim Lemström considered that he might produce this ether current by mechanical action. He therefore made a paper tube having two concentric walls and mounted on an axle. A core of soft white iron was placed within the tube, and on rotating the latter the core was found to be magnetic, as demonstrated by two fine astatic needles. Reversing the rotation, reversed the magnetic poles; and M. Lemström concludes that the relative motion of the ether in the revolving tube and the stationary core was the cause of the polarity. It follows that if the tube be stationary and the core revolved a similar effect will be produced; and hence if a magnetic body like the earth be rapidly rotated round its axis in an insulating medium like the air, it will exhibit magnetism. Pursuing this idea into mathematics, M. Lemström arrives at an expression for the magnetic moment of the earth which agrees very well with the formula of Gauss.

FISHING ON THE AMAZON.

Much attention has lately been given to the wonders of the great river Amazon, or "the Amazons," as the people there call it. Its whole valley abounds in streams that help to make up the entire volume of waters. These spread out into lakes, lagoons, and swamps, that extend over large regions of country. This is especially so in the rainy seasons or flood times.

The channels and lakes are abundantly supplied with fishes. Even large fishes are often left in the swamp lakes and streams when the water is low. A hundred different kinds of fish can be bought in the markets of Rio, many of which come from the Amazon.

Those most valued are *piranhas* and *pirarucus*. They are the largest, while there are numerous smaller varieties. The Indians catch the latter with hooks and lines or shoot them with arrows. But the larger fish are speared with a kind of trident. The men and even small boys acquire great skill in the use of these implements.

In the summer months the people come by hundreds to the lakes and channels to fish for the great *pirarucu*, and to prepare the fish much as codfish is prepared by the northern fishermen. Some of these fish are seven or eight feet in length. They are first dressed and cut into wide thin slices. These are well rubbed with salt and hung on poles to dry in the sun. The slices are taken under cover every night and carried out again in the morning. The stranger does not at once relish this dried fish, yet it is the standard flesh food of all the poorer classes throughout a large part of Brazil. During the fishing season the people build and live in little huts along the shores. Traders, in canoes, come with a stock of cheap wares to barter for the fish. Thus a trading community is formed, which breaks up with the January floods. The *piranhas* are much prized and are easily caught, for they are greedy to bite at most anything, from a bit of salt meat to a bather's toe. Boys thrash the water with poles to attract these fishes.

The Tupi word *piranha* is a contraction of *pira sainha*, meaning "toothed fish." The same word is used by the Indians to describe a pair of scissors. There are several species of these savage *piranhas*, some being more than two feet long. They make nothing of biting an ounce or so of flesh from a man's leg. People are sometimes killed by them. Hence Brazilians are shy of going into these lakes and streams if they suspect the presence of these fish. The fishermen claim that *piranhas* will gather in schools against the larger fish and attack them. If one of their own number is at all wounded by mistake he is mercilessly set upon and devoured by his companions.

It is useless to try to use nets where this fish is found. They would spoil a net in a few minutes.

Another dangerous fish of these waters is the *sting-ray*. He lies flat on the bottom, his dark upper surface being hardly seen through the muddy streams. If left undisturbed the creature is harmless enough. But a careless wader in the shallows may step on the flat body, and then the great barbed sting inflicts a wound that benumbs the whole body and makes the sufferer speechless with pain. Persons have been lamed for life by such a wound.

A curious fish called *Anableps tetrophthalmus* is often seen there. Its eyes are divided, so that each has two pupils; of these the upper pair are for the air and the lower for the water. This singular fish swims near the surface and near the shore, and if chased does not dive.

A large fish named *caruana* is mostly taken at night. Men go out in boats with lighted torches and spear the fish with great skill and rapidity.

It is said you may often see a native with his bow and arrow standing like a statute on some overhanging bank watching for a fish to pass. When a fish comes near the bow is drawn quick as light, and the arrow hardly leaves a ripple as it cuts through the water. It requires the keenest skill to obtain fish by this means, and the fisherman must also allow for the refraction of the water, or he will certainly miss his mark. Yet many of the large *piranhas* are procured in this way. Good fishing depends, first, upon the flooding of the river, which fills all the valley lakes and channels with water and entices the fish out of the greater streams; then, second, such a falling of the floods as leaves many of these channels and lakes separated from the river. Thus the fish are imprisoned in shoal water and narrow quarters and more easily taken. Otherwise the present contrivances for procuring good fish by these native fishermen would be entirely inadequate.

Wallace, Smith, and others who have made recent explorations of the Amazon all speak of its prospects as a future highway of commerce. They also dwell much upon the abundant and even luxuriant natural resources of the entire region with which this great river and its tributaries is connected.