

Some of the World's Great Sources of Electrical Energy; Recent Progress In the Development of the force

TO harness the waterfalls, transmute their power to electric energy and transport this to turn the machinery of man is now an old story. But the extent to which the work is being carried and the

wonderful devices it employs are new enough to challenge attention. That this process may destroy the loveliness of some of the earth's most famous falls is possible. Even Niagara has been threatened. Against this have been gone up a storm of protest. Thus is being fought over the old battle between the utilitarian and the lover of nature. In the case of Niagara it is probable that some ground of compromise may be found between beauty and use, but other celebrated waterfalls, notably the lovely cascade at Tivoli, Italy, are already ruined.

All over the earth hydro-electric power houses are being established. Even in the heart of Africa a tumbling cataract is soon to be changed into motor force. The Italian government has taken this work out of private hands, just as it has taken the railways, and itself is transforming the waters flowing from the Alps and Apennines into measured amperes and volts. All Europe is being furnished power from the streams and mountain cascades. Soon, gravity will be turning the dynamos of the world.

Nowhere is this work bringing forth more marvelous results than in the United States. The power houses already completed or under process of construction at Niagara, it is estimated, will in time turn out 1,000,000 horsepower. This would run all the street cars, surface, elevated and subway in the entire country. True, much of this power is being utilized in Canada, but commercially and industrially the Dominion and the republic are not so far apart, even if they are divided by a political line.

In many other of the western states, and in fact in all parts of the country, similar power houses are in existence or are being constructed. The energy locked up in the streams of America is incalculable. Much of it can be transformed into electric force. Let those who have been worrying about a possible exhaustion of the coal supply turn to the streams and be comforted. And how much cleaner and more quiet is this electric power than that generated by coal and steam! It takes no great stretch of the imagination to picture silent, white and beautiful cities of the future, whose motor force, light and heat will be furnished by distant cascades in the form of hydro electric energy.

Science in its highest form becomes romance. The great savants are poets who write their epics of power and lyrics of light all over the cities of the earth. Modern inventions appeal more to the imagination of man than did the old myths and tales of warrior heroes and human gods. In the scientific wonders of today the artistic and utilitarian meet. Yet "we are but babes in progress." We are only on the edge of the wonder world that science is still to discover. Thus the beauties of the cascades will only be lost that they may be born again in more marvelous and dazzling forms.

Nothing ever accomplished in the history of electrical development is more interesting to the American public than the supply scheme which has the great natural force of Niagara as its power center. On the western border of the state of New York an army is being assembled in line, and it has already begun its march toward New York city, that most reliable of all the world's markets for the sale of power. It is an

army of curiously built steel towers and wooden frames, all designed to transmit electric force from a power house on the Canadian side of the Niagara river directly through the state of New York. This transmission line is a wonderful work. When it is completed it will surpass in magnitude of development most of the electric schemes yet devised by the hand of man. There is nothing that will compare with its line of towers and great stretches of white cables. Heretofore the California transmission lines have carried off the palm for length, but this new Niagara line, the present destination of which is Syracuse, N. Y., 157 miles eastward from the great falls, will surpass the longest of these Pacific coast carriers.

The power station which is to supply the current for this mighty project is a characterless looking structure built of concrete, low, but rather massive. To make a lodging place for it

permit the passage of the steel penstocks that carry the water down to the wheels at the station. A head of about 175 feet is obtained.

Perched on the top of a bluff to the rear of Victoria park, at least 255 feet above the power house, is situated the distributing station. Here great transformers will be installed to raise the current to a voltage sufficient for its transmission to another station that is being built near Lockport, N. Y. The

is not diverted necessarily from its original appearance and the apparent volume of the overpour remains the same. A certain amount of the water is conducted into artificial channels, and then to steel penstocks, or tubes, through which it drops to the turbines below. This need not be done in the immediate vicinity of the fall itself, and in the case of the recent operations at Niagara the canal carries the water needed to the edge of the gorge, some distance below

the system for gathering water in the Sierra Nevada range. The company now supplies a very large district, many street railways, newspaper presses and factories of every description being run by the electric current produced in the mountains. This immense work is accomplished with less than 50,000 horsepower. The company has been so successful financially that it is now replacing all of its old wooden flumes with others more substantial and is building miles of new ones. The actual area of the watersheds drained by the flumes of this one company covers 552 square miles.

There is no difficulty in securing abundant power in this mountain region. The force of the water rushing through the penstocks is such at the power houses that it "eats" through

a cambrie needle at the Comstock mines under a head of 2,000 feet went through a two inch plank like a bullet. When the dynamos are idle the unused water is shot out into space above them. A log thrown into the escaping stream would be shattered into bits and a rock as large as an athlete could lift would be hurled across the canyon like a shell from a gun.

The sensitiveness of a great electric plant is marvelous. When a street car stops or starts at Oakland, 122 miles from the power house, the electric governors respond instantly to the added or released burden of the dynamos. Everything is so accurately adjusted that the turbine wheels receive only the exact amount of water required by the present needs of the system. The slightest diminution of the demand for power

national wealth should be withheld from private speculation. Italy is rich in waterfalls of great volume, and they were at the disposal of the government. The Italian state did not hesitate on account of sentimental reasons. It seemed a pity to sacrifice the beautiful cascade of Tivoli, and the whole world cried out against it, but the government decided that it was necessary to give the proper impetus to the revival of the national industries, and it became an early victim to the firm determination of the authorities to put Italy on a sound industrial basis.

The big works at Vizzola furnish an example of what has been accomplished by the Italian government. The waters of the Ticino are converted into power near Somma, in Lombardy, and from this point electrical energy is transmitted to several power spinning mills. Ten groups of dynamos with horizontal turbines directly coupled are operated in the central building at Vizzola.

One of the greatest future sources of electrical energy will be furnished by the Zambesi falls in Africa. Its total horsepower is conservatively estimated at 45,000,000. The fall is nearly twice as lofty as that at Niagara. The largest turbine in existence at the present time is at the Shawnegan power station in Canada. Its weight is five tons, and the intake is ten feet in diameter. The amount of water passing through per minute is 400,000 gallons. The building of the new dam across the Elfen valley, in the Aix la Chapelle industrial district, will add greatly to the prosperity of the famous region. The lake created by this new triumph of engineering will furnish sufficient water power to generate electrical force for all that part of the German empire.

DAVID E. SPERRY.

TAMED BY LAVENDER.

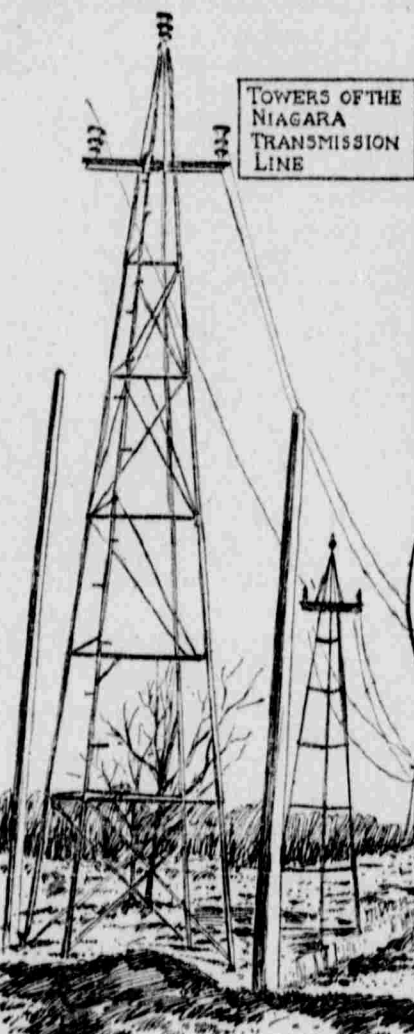
Cat stealers are invariably well provided with tincture of valerian, which is made from the valerian officinalis, a plant common in English hedgerows. All cats delight in valerian, and, being loving as a cat is by nature, yet any tabby, well provided with this scent, will forget its home and remain content among strange surroundings.

Catnip, a kind of mint, has gained its name from the intense delight which pussy takes in it. When a cat finds a bed of catnip she will lie down and roll in it in a sheer excess of joy. All the cat tribe seem to have a strange partiality to certain scents. A troublesome lion in Mr. Hagenbeck's collection is perfectly content when presented with a handkerchief soaked in lavender water. Its master can then enter its cage in perfect safety. It sniffs and bites the handkerchief, purring all the time.

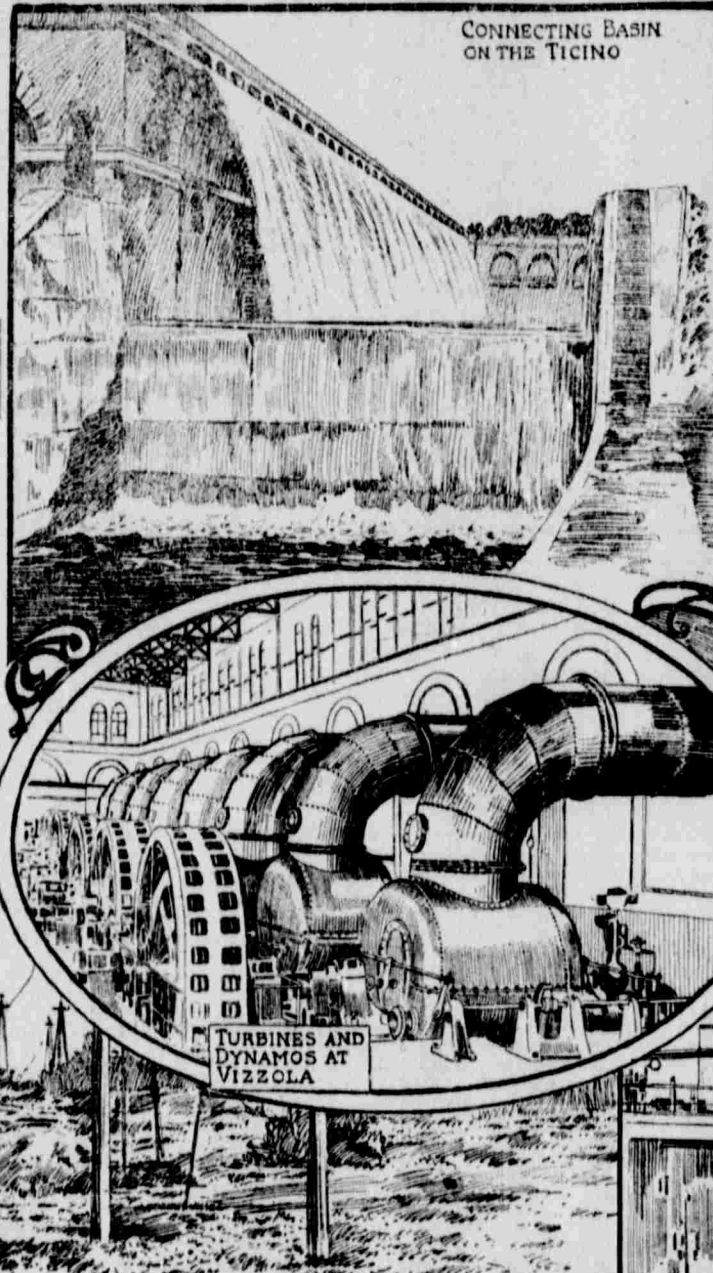
While lavender or similar spirituous scents will drive a dog frantic, yet the canine race have their own preference. In the way of scent, and this dog stealers know well. Oil of aniseed possesses an irresistible fascination for all dogs, and by rubbing some of it upon his clothes a professional dog stealer will entice almost any dog to follow him.

LUCK IN NUMBERS.

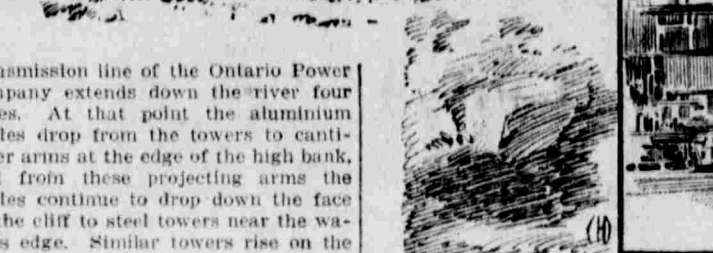
Numbers are male and female. The number one is male, two is female. Three is universally allowed to be a sacred and lucky number. In all affairs of importance six is to be avoided. The number seven is an excellent one, possessed of many virtues. The seven is son is certain to make his way in the world, and the seventh son of a seventh son is sure to be an infallible doctor. Ten is a sacred number. All odd numbers are lucky except the number thirteen. All kinds of remedies should be taken an odd number of times, the best being three, seven and nine.



TOWERS OF THE NIAGARA TRANSMISSION LINE



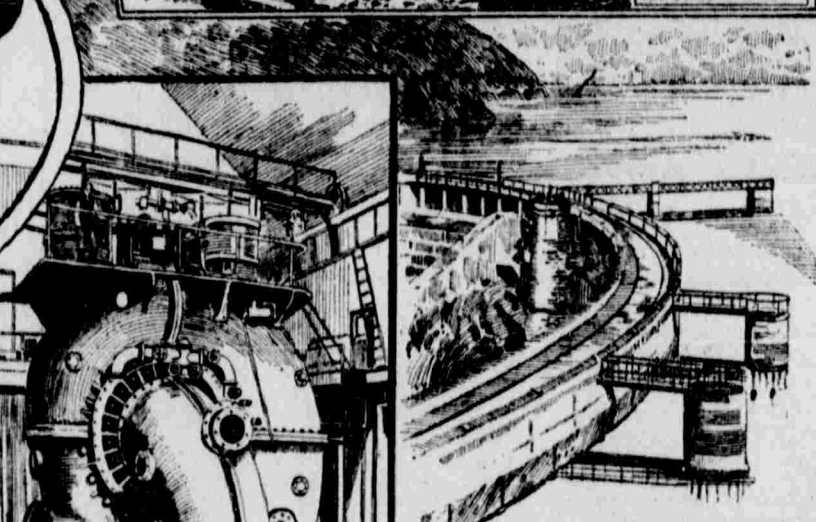
CONNECTING BASIN ON THE TICINO



TURBINES AND DYNAMOS AT VIZZOLA



A PERILOUS TRIP AT NIAGARA



NEW LAKE AT EIFEL, GERMANY



LARGEST TURBINE IN THE WORLD

the debris slope of the famous old Niagara cliff was removed almost to the very spot where the Horseshoe makes its plunge. The building is so close to the falls that its exterior is bathed continually in the spray from the waterfall.

At the present time the installation of the power house consists of three units of 10,000 horsepower each and one unit of 12,500 horsepower. The contemplated installation for this section of the power house is 60,000 horsepower. When this installation has been made two more sections of 50,000 horsepower each are to be erected. This will provide a total energy of 130,000 horsepower.

This power house gets its water supply through a steel flume which has an inside diameter of eighteen feet. It is almost a mile in length. The site of the development is just beneath historic Table Rock, and at that point the cliff has been pierced by several tunnels to

transmission line of the Ontario Power company extends down the river four miles. At that point the aluminum cables drop from the towers to cantilever arms at the edge of the high bank, and from these projecting arms the cables continue to drop down the face of the cliff to steel towers near the water's edge. Similar towers rise on the New York side. From tower top to tower top the span is over 600 feet. It is thus that the strong aluminum cables cross the Niagara.

It is especially worthy of record that an effort has been made by the promoters of this great enterprise to interfere as little as possible with the scenic value of the region. In many cases the conversion of a part of the flow of water over a fall has been effected without diminishing perceptibly the original natural appearance of the cascade. In tapping a natural waterfall for the purpose of energy production the fall itself

the falls. The buildings necessary have in most instances been made as inconspicuous as possible and have been located in places remote from the public observation. Some ingenious feats have been performed by workmen in the effort of placing material in spots where it will be invisible to the casual sightseer.

In the Pacific states several gigantic enterprises for the conversion of water power have been carried to success. One of the most noteworthy of these is

steel and iron plates, planking and even solid masonry in an incredibly short time. This makes it necessary for the company to keep on hand at all times a large supply of cast iron plates to renew these "eaten" through. The water leaves the nozzle at a velocity of 17,000 feet per minute and travels at the rate of three miles per minute in its sheer descent of 1,000 feet. Further to illustrate the mighty power of this water supply may be stated the fact that a leak no larger in diameter than

throws the superfluous water into the air races. When the full power of the dynamos is wanted not a drop of water escapes until it passes through the turbines to fall gently out of the way, shorn of all its force. In the summer, when the storage reservoirs get low, the water which passes through the turbines is taken back by the electric pumps into the main storage reservoir whence it came.

While America has been pre-eminent in the utilization of hydro-electricity, other nations have not been backward. Among European competitors in the electric advance Italy stands foremost. During the past few years Italian industries have taken a tremendous forward leap on account of water power conversion. The government itself is at the head of the scheme, having decided that this source of na-

Story of the Earth's Most Interesting Meteorites; Strange Aerial Visitants Whose Origin Is Still Unknown

THE recent acquisition of the famous Willamette meteorite by the New York Museum of Natural History adds greatly to that institution's pre-eminence as a collector of these

ponderous natural wonders. It was already in possession of the great Peary find, the largest meteorite mass ever known to mankind, and this latest addition makes the museum the owner of two of the three largest meteorites in the world, the third being in Mexico. The scientific value of these curiosities is beyond compute. The intrinsic value is, of course, a matter of speculation, but some notion of its reality may be obtained from the fact that the museum authorities paid \$25,000 for the Willamette meteorite, a transaction made possible by the generosity of Mrs. William E. Dodge of New York.

This Willamette meteorite has made a good deal of stir in the world. It was found in 1931 by a prospector named Hughes, who was one day outwandering aimlessly in a forest near the little Oregon village of Willamette and chanced to strike his hammer against an unfamiliar object just below the surface. He jumped to the conclusion at once that he had discovered a bed of ore and proceeded to dig around it. When he had excavated far enough to see that it was a detached mass, he made up his mind that he would remove it to his own premises, about thirty miles distant.

So he filled in his excavation, carefully destroying all evidence of recent digging with a coating of forest litter. Then he returned home, confided his secret to his young son and announced his intention of securing the treasure. The boy entered enthusiastically into the scheme and promised to help all he could. A night or two later the pair set out in an ordinary farm wagon drawn by a team of undersized mules. How they finally accomplished their undertaking—a man and a boy and an ordinary pair of farm mules—is still a mystery. How they uncovered this twenty ton mass and loaded it on a common wagon and transported it thirty miles without discovery is a puzzle

that smacks of unreality, but it seems to have been done. They were more than a week in making the return journey, moving only by night to avoid detection.

All their effort to keep the business secret proved futile. It leaked out

teorite did not properly belong to the land on which it was found, not being a part of it and having fallen upon it at some period subsequent to the creation of the earth. It was a knotty point, and the lawyers found abundant meat in it to advance some novel and

and Lewis exposition at Portland, Ore. It speedily became a center of interest for scientists, and all the great museums in the world began to scheme to get possession of it. The only thing that operated against one of the most active professional competitors ever

race, the matter was settled amicably and the wonder came into the market with an unclouded title. The friends of the Museum of Natural History were on the ground and were alert. Thus it was that Americans were spared the humiliation of seeing this strange aerial

settlement at Whale sound, Peary saw a small native knife which attracted his attention. The edge was composed of five small pieces of iron. It was the only one in the tribe, and Peary had seen nothing to indicate the presence of metal in the vicinity. He made inquiries, but the old men shook their heads; not one of them knew aught save that it was very old and had come from the "iron mountain," which they could not or would not locate.

The explorer resolved to make a search for the mountain. After many weeks, on the northern shore of that desolate body of water known as Melville bay, Peary came upon three meteorites. They were known to the few Eskimos of the region as the Woman, the Dog and the Tent. The Woman and the Dog were brought to the United States in 1895. Peary loaded them by means of hydraulic jacks and started southward. On the cruise home the presence of the masses of iron affected the ship's compass to such a degree that in bad weather the sailors could not keep to their course, but had to depend on dead reckoning. These smaller meteorites were landed safely and are now in the New York museum with their larger companion. The Woman has a weight of six tons and the Dog only one.

But Peary was not satisfied until he had made an attempt to transfer the gigantic Tent to home soil. He was not satisfied even then, for his first attempt resulted in failure to tear the monster from its icy bed of centuries. He returned to the task with largely increased facilities and finally succeeded in moving the mass inch by inch with his powerful hydraulic lifting apparatus and loading it on the deck of the Hope. When it touched the deck the Eskimos who had helped to load it bolted for the shore in great haste, believing that it would sink the ship. The stanch craft careened visibly, but soon righted herself and the homeward voyage was begun. It was the most laborious voyage Peary ever made. The ship had to cut her way through icebergs, and the storms were so violent that it seemed almost probable that the Tent would get loose and crash through the ship's sides. Every man on board, not excepting the intrepid commander, was relieved when the unwieldy cargo was

landed at the Brooklyn navy yard. There it remained until it was taken to the museum on a specially constructed truck drawn by thirty-five Percheron horses.

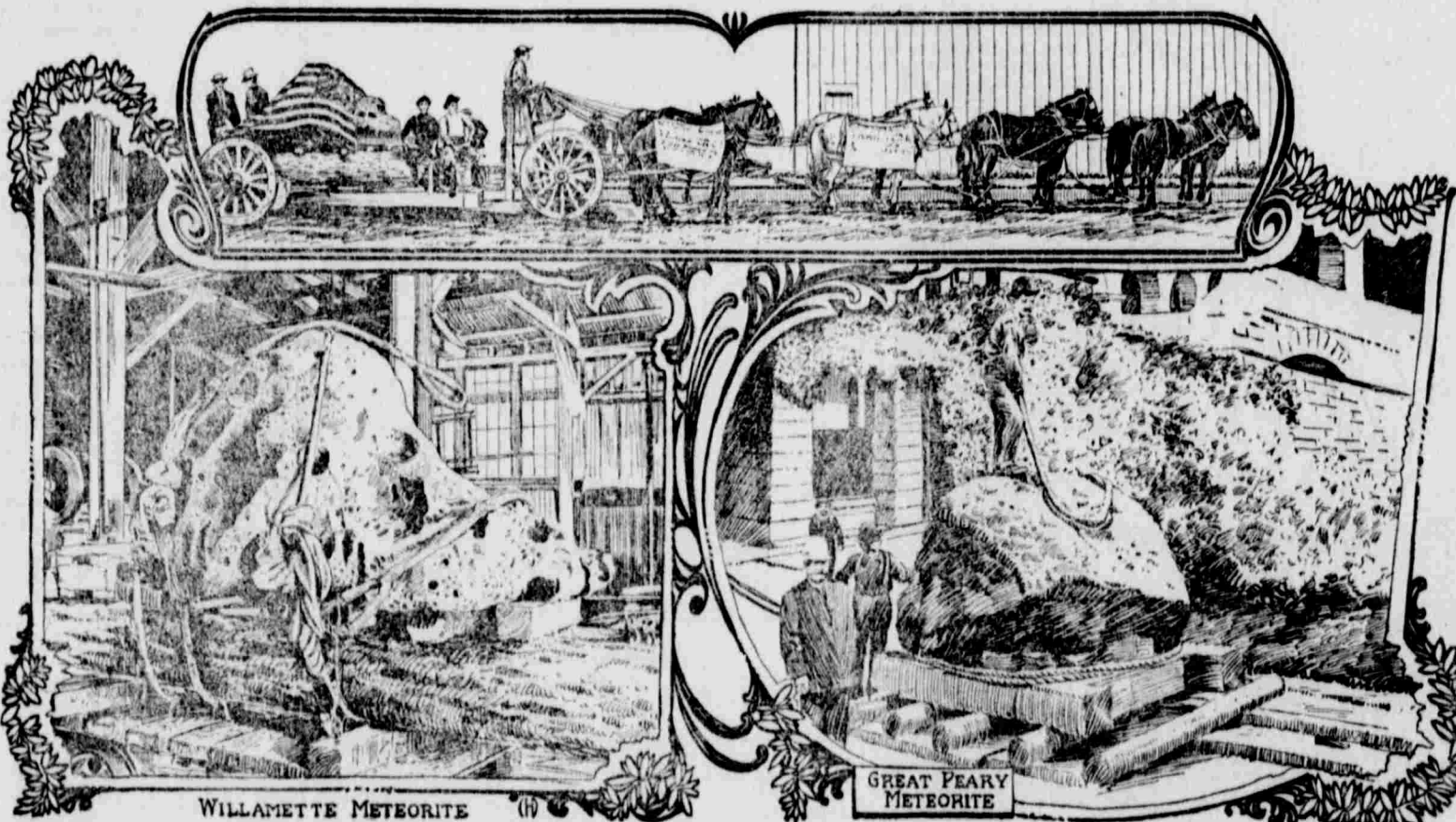
So far as known, these three were the only meteorites in Greenland. They are also the only ones ever found so far north. They seem to be a combination of iron and nickel, with some carbon, and are the most metallic of all meteorites, unless the scientific explorations now progressing in Arizona shall uncover something even more wonderful. Shafts are now being sunk in that American wonderland with the intention of getting at the secret of Meteorite mountain, whose great crater is believed by scientists to have been excavated by the mighty impact of the largest meteor that ever plunged into the bosom of the earth.

HERBERT E. LOVEJOY.

POCKET STATES.

The smallest principality in the world is Monaco. It has an army of 126, and there is no conscription and no taxes. The whole available ground is built over, so there is no cultivation. The principality includes Monte Carlo, the gambler's paradise. It is on account of the immense sums left behind by visitors to the casino that Monaco is not harassed by taxation.

Prince Albert I. has not a very responsible position as ruler over six square miles. He is devoted to science and is well known among scientific men, for his researches in marine biology. He derives an immense income from the gaming house and the results largely benefit his people. His heir, Louis, has won his case. His new subjects are delighted, for they bitterly resented the Kaiser's interference.



WILLAMETTE METEORITE

GREAT PEARY METEORITE

presently, and the Portland Land court appointed a receiver, who took charge of the curiosity until its proper status could be defined, and there was a lull in the proceedings.

During this period of legal inaction the chief of the mineral division of the geological survey borrowed the meteorite and put it on exhibition at the Clark

starting theories, some of them more theological than legal. Finally the court appointed a receiver, who took charge of the curiosity until its proper status could be defined, and there was a lull in the proceedings.

At last, however, after the representatives of the curators of foreign museums had become disgusted with the legal tangle and had withdrawn from the

visitant to the western world taken overseas.

The other meteorite treasure of the museum, the Peary find, is the largest specimen ever discovered. It is about forty tons in weight and was brought from the coast of Greenland by the Hope, Peary's arctic exploring vessel. One night about ten years ago, while spending a few days at a small Eskimo