A Wire Fence Telephone Wanted.

"Down in Texas," says an electrical salesman, in Electrical Review, "I think there is a good demand for a telephone that can talk over 100 miles of barbed wire fence. On the ranches cowboys are kept 'riding the fence,' that is, riding up and down a section of barbed wire fence, inspecting it and keeping it in order. Many ranches are twenty, thirty, and fifty miles square, and if a serious break in a fence is found, the cowboy must ride back to the ranch to report. Now if a good telephone could be provided for each section, it would save all that riding. The staples holding the two top wires to the posts could be removed, insulators put in their places, and a man would have a complete metallic telephone circuit around his ranch."

THE UNITED STATES RAM KATAHDIN.

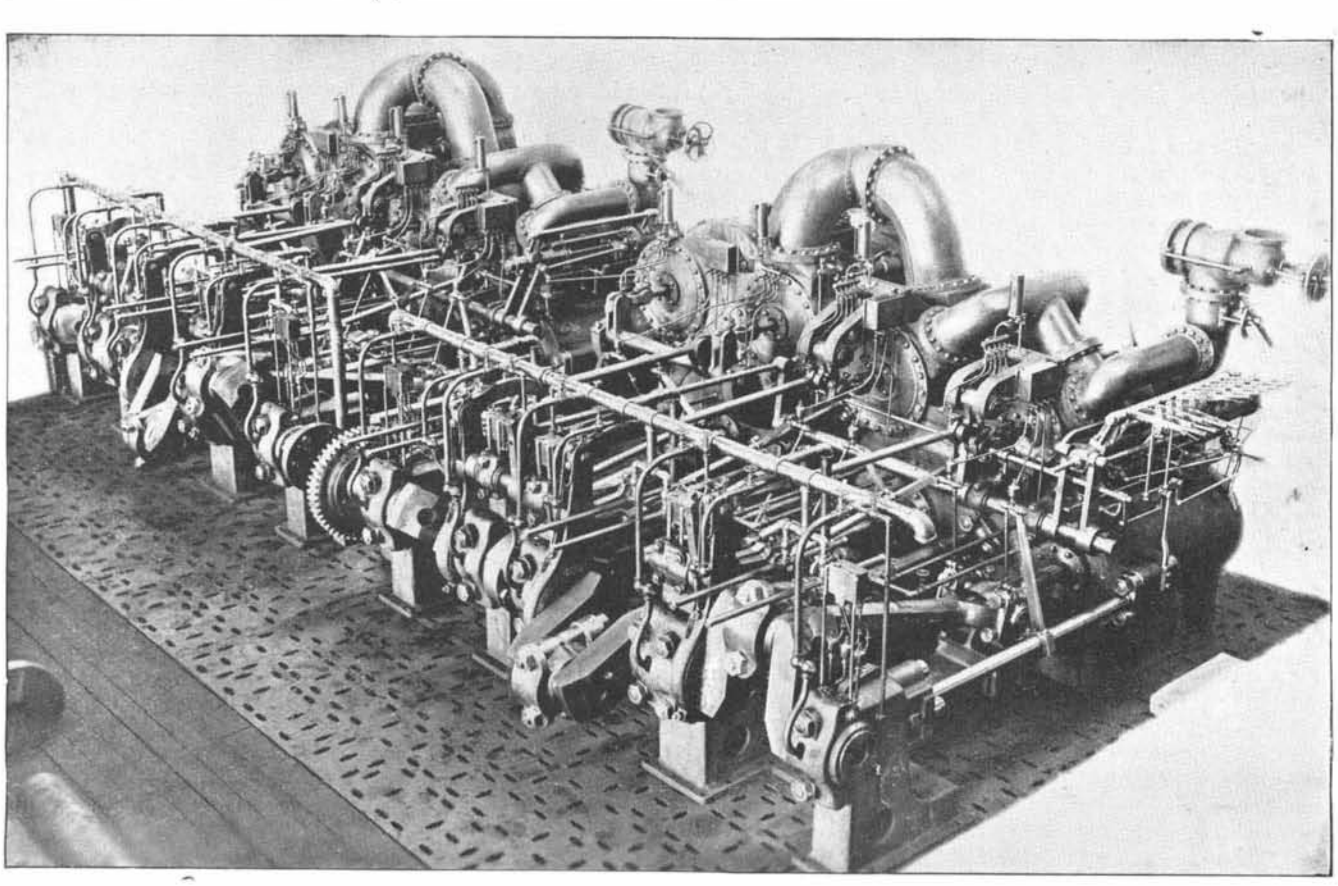
The possibilities of what may be accomplished by the ram in naval warfare have long been the subject of argument among naval experts, but the most important vessel ever specially designed and built for this purpose expressly is now nearly ready to be put into commission, i. e., the ram Katahdin, the engines of which are shown in the accompanying illustration. She was built after the plans of Rear Admiral Ammen, with whom the subject had been a favorite one for many years. She is a twin screw armor-plated vessel designed on the longitudinal and bracket system, with an inner bottom extending from the collision bulkhead to the stern. The longitudinals and girders supporting the deck are to be continuous, converging to the stem casting and to the stern, the frames and beams to be intercostal; the depth of longitudinals and vertical keel throughout their length to be 24 inches, the girders supporting the armored deck to be 15 inches. The vertical keel, two longitudinals, and armor shelf on each side of the vertical keel are to be watertight, forming transversely six compartments, these being divided longitudinally by watertight frames. By this means the space between the inner and outer skins is subdivided into seventy-two compartments. The transverse and longitudinal bulkheads between inner skin and deck armor divide this space into thirty compartments, making a total of 102 compartments in the vessel. The vessel is to be provided with a removable wrought steel ram head, to be accurately fitted and securely held in position in the cast steel stem. The principal features are:

Length over all	243 ft.
Length on load water line	242 " 9 in.
Breadth, extreme	43 " 5 "
Breadth on water line	41 " 10 "
Draught amidships	15 "
Displacement	2,050 tons.
Indicated horse power	4,800 "
Speed	17 knots.

The outside strake of the deck armor is to be six inches in thickness, the next strake inboard to taper in thickness in its breadth from 5½ to 2½ inches, the remainder of the deck plating to be 2½ inches in thickness, including the lower course of plating. The side armor is to be two strakes in depth, the upper 6 inches in thickness and the lower 3 inches, to be secured by bolts with countersunk heads, driven from the outside through wood backing of yellow pine and two backing plates, each 20 pounds per square foot, and set up with nuts on rubber washers. All hatches through the armored deck are to have battle plates, and the smoke pipe and ventilators to have inclined armor 6 inches in thickness. The conning tower is to be 18 inches in thickness.

There are two engines, horizontal, direct acting, triple expansion, driving twin screws, the cylinders 25, 36, and 56 inches diameter, respectively, and with 36 inches stroke, common, with 4,800 horse power when making 150 revolutions per minute. The main steam valves are of the piston type, one for each high and intermediate and two for each low pressure cylinder, driven by Marshall radial gear, with compensating rock shafts, and all the valve gear except the rock shafts being interchangeable. The engine keelsons are built in the ship and the cylinders cast with brackets attached to be bolted together and to the keelsons. The cylinders are also attached by forged steel tie rods to the bed plates and engine frames. There is one forged steel piston rod for each engine, with a crosshead working on a cast iron bar guide, the valve stems being of forged steel. The crank shafts are in two sections for each engine, of mild forged steel, 10¾ inches in diameter in the journals and 11 inches in the crank pins, there being axial holes 5 inches in diameter through shafts and pins.

There is to be a complete installation of electric lights sufficient for lighting all parts of the vessel, and arranged in duplicate so as to guard against accident. The drainage system is to be so arranged that any compartment can be pumped out by the steam pumps. The vessel is to be submerged to fighting trim by means of valves, one in each transverse watertight compartment of the double bottom; and sluice valves are to be fitted in the vertical keel and the watertight longitudinals in these compartments. The only projections above the armor deck are the conning tower, smoke pipe ventilators, hatch coamings and skid beams on which the boats are supported. The vessel has no armament, and is to rely entirely on the ramming for her offensive power.



ENGINES OF THE NEW UNITED STATES RAM KATAHDIN.

Protection of Iron Columns.

Some experiments were recently made by the Buildings Inspection Department, Vienna, on the protection of iron from fire by incasing it with brick. A wrought iron column, 12 ft. long, and built up of two channels connected by lattice bars, was used. This was set up in a small chamber constructed of brick, and the column was loaded by levers. This done, it was surrounded by a 4½ in. brick wall laid in fireclay mortar. The wall did not fit closely round the column, and advantage was taken of this to fix there samples of fusible metals, and which should serve as a gauge of the temperature attained. Various samples of stone concrete and other materials were also placed in the chamber within the column. This chamber was then filled with split firewood, which was lighted and the doors immediately walled up with slabs of plaster of Paris. After the fire had burned out, the doors were broken in and a stream of water turned into the room from a 14 horse-power fire engine. An examination of the room next showed that the walls of brick laid in Portland cement retained their strength, while most of the natural stones left in the chamber had been destroyed. The ceiling had been lined partly with plaster of Paris and partly with terra-cotta tiles. Both were damaged. The inclosure round the iron pillars was still standing firm, though corners of the brickwork were chipped 1 in. or so, and the fireclay mortar was largely washed out of the joints. On removing the casing, however, the pillar inside was found to be uninjured, even the paint being unscorched, and the fusible plugs only showed a temperature of 149 deg. Fah.

ACCORDING to a French journal, a Geneva firm is manufacturing phonographic clocks which talk the hour instead of striking it.

Mending Cracked Negatives.

To make a cracked negative fit for use, Dr. Miethe recommends the following process: Place the broken negative, the film of which must be intact, film side down upon a metal plate which has been heated so that it can hardly be touched by the hand. The break is then covered with Canada balsam, which readily melts and fills up the cracks. To give the negative more stability, a large piece of the Canada balsam is put upon the center of the back of the negative, and a clean glass plate the same size as the negative is laid over all. The melted balsam spreads out evenly, the excess being squeezed out. After cooling, the plates are still further fastened around the edges with strips of Sheplie gum paper.

Explosive Coal Dust Experiments.

It is reported that, at the recent meeting in Newcastle of the Federated Institution of Mining Engineers, some experiments were shown by the Flameless Explosions Committee of the North of England Institute of Mining and Mechanical Engineers, with the object of illustrating the effect of coal dust in explosive atmospheres composed of a mixture of fire-damp and air. The experiments consisted in firing gunpowder into the ordinary air; into an inflammable mixture of mine gas, direct from Hebburn Colliery, and air; into ordinary air with coal dust in suspension, and into ordinary air with coal dust lying quiescent. The shots were fired into a specially prepared chamber, consisting of a cylindrical tube, 100 feet long and 3 feet in diameter, made of boiler plates. The tube had safety vents at intervals along the top, closed by wooden plugs loosely knocked in; and its far end was closed before commencing any experiment with a sheet of brown paper. In the experiment with common air, fired into by gunpowder alone, a bright flash was observed in the chamber; and the brown paper was blown off the end of the tube. When coal dust was present, without gas, either in suspension or quiescent, the flash was considerably brightened and lengthened; and not only was the brown paper blown off the end, but a huge cloud of smoke was propelled for more than 30 yards from the mouth of the chamber, and many of the plugs were forcibly projected from the safety vents, being followed by rushing jets of thick black smoke, and in some instances flame—suggestive of the explosiveness of the mixtures of coal dust and air. The force of the explosion of fire-damp and air was also well exhibited.

A Train Wrecked by a Tornado.

On the afternoon of Sept. 12, a west-bound passenger train on the Iron Mountain Railroad at Charleston, Mo., had just reached the city limits when the passengers and crew noticed the approach of a funnel-shaped cloud which was dealing destruction to everything in its path, uprooting trees and hurling missiles before it. The train and the tornado met, and the wind lifted the cars and landed them 20 feet from the track, almost turning them over. Two persons were killed, and 11 injured.

Aside from the wreck, the damage done by the tornado was slight. Its path was not over 30 yards wide, and it did not extend more than a mile.

Wave Power.

A correspondent from Maryville, Mo., who obtained the idea from a spouting rock in California similar to the spouting rock of Newport, suggests a plan for collecting and utilizing sea water for power. His idea is to excavate a conical tunnel in the rock or the building of such a tunnel in the sand, through which the waves may force water intermittently into an elevated reservoir, the pipe between the tunnel and the reservoir being provided with a check valve. The water stored in the reservoir could be utilized for power at pleasure.

A Day on the Fish Hawk.

BY CHARLES BARNARD.

When the first settlers came to this continent they found the rivers and the sea swarming with fish. There were shad and salmon in the rivers; herring and smelt filled every little creek; mackerel in immense schools rippled the waters of the bays; cod and halibut could be caught in boats off the shore, and oysters and lobsters were abundant everywhere. Now many of these fishes are very scarce or have totally disappeared. As more people came here, more fish were needed, and we caught them too fast. Then the fishermen began to be alarmed, and asked what it all meant. There was only one man who could explain the matter—the zoologist.

Now, the zoologist is modest, and he said, very plainly, "I do not know what is the matter, but I can find out. Give me a steamboat and I will study these fishes, and then I can tell you what you had better do about it." So it happened that the government built a steamboat and called it the Fish Hawk, and on this boat the zoologist has been at work for sometime, and has learned more about the sea and sea-life than we ever knew before.

One bright summer morning, a few weeks ago, the Fish Hawk lay at the Lighthouse Dock, near Tompkinsville, Staten Island. As it was vacation time, a party of zoologists had been invited to spend a day on the boat, and see how the zoologist-in-chief studies the lives of fishes who live deep in the sea. So it was, also, that the zoological historian came to go, too. It was vacation for the visitors. On the Fish Hawk there is no vacation. The year round, it sails and sails, searching everywhere for new facts about fishes. Part of the time it is also busy hatching young fish. The work of this trip was to see how the zoologist gathers up fish-life from the floor of the ocean. We steamed out past Sandy Hook and steered away for the Lightship. By noon the big hotel on Long Beach could be seen ten miles to the north, and Sandy Hook Lightship lay about twelve miles to the west. Then we prepared for the strange work of the day.

To understand it all, we must examine the boat as a machine, or part of a machine, used by the zoologist in his curious studies. The Fish Hawk has two screws, so that it can be handled with the greatest precision, one or both of the engines being used to place the boat in any required position, or give it any required direction when in motion. The wheel-house is on the upper deck, forward, so that the boat can be controlled from a single point. The stout foremast is immediately in front of the wheel-house, and has a long pivoted boom like a derrick. At the foot of the mast is a steam hoisting engine, controlling a long steel cable. This cable is arranged like the hoisting rope of an ordinary derrick, except that the cable, before passing through the boom of the derrick, passes through a pulley attached to a powerful steel spring placed near the top of the mast. This spring is used to take up any sudden jerks or strains that may come on the hoisting cable when it is in use, and thus prevent it from breaking in sudden strains. This derrick and cable are the zoologist's fishing line and pole.

For a hook he uses a curious iron frame, shaped like the runners of a sledge. This is the mouth or open end of a huge woven net, and the whole apparatus is called a "beam trawl." The net attached to the frame when drawn out resembles a huge purse, the lower part ending in a point or little pocket. This end is open, but can be securely closed by tying it up with a rope. The zoologist uses this great net by dragging it over the bottom of the sea, the ship, the derrick, and the engines all working together to make its iron runners slide over the bottom of the water and scoop up whatever fish are in its way. Before we see the zoologist go a-fishing we must notice one more little machine. This is the sounding wire, for ascertaining the depth of the water. This is a fine steel wire wound on a spool and carrying at the end a brass weight or plummet, having a "grease cap," or little pocket for grease, at the end. Above this is placed a self-recording thermometer. This is arranged in such a way that, on letting a brass weight slip down the wire, the thermometer, when struck by the weight, records the temperature of the water wherever the glass may be.

The real work of handling the great net, or "dredging," as it is called, is performed by the officers and men of the boat. The zoologist's work comes afterward. So it happened that we all stood on the upper deck watching the performance. It was a curious sight. We were all alone on the sea, with only the dim, hazy Highlands visible to the west and the white steamer rolling lazily on the Atlantic waves. The engines had stopped, and the boat was drifting on the tide. The captain stood at the bows, with the second officer at his side. There was a man at the wheel waiting for his commands. There was an officer at the bells to control the engines, a man at the hoisting engine, a man at the sounding wire, and a dozen sailors standing ready by the big trawl. Below, the engineers and firemen were all in place, ready for their important though unseen work. An officer also stood ready, notebook in hand, to make a complete record of the work.

The man at the sounding wire began to turn his crank and wind in the wire. Then he reported that the water was thirteen and a half fathoms deep, and the little stones clinging to the grease showed the bottom to be gravelly. A word from the captain, and the hoisting engine began to turn, and the great iron-mouthed net rose in the air, the boom swung out on the water, and the net dropped out of sight in a ring of foam. The cable went singing and hissing through the green water, and in a moment it slackened up—the trawl had reached bottom, eighty feet under water. A rope fastened to an iron ring that slid along the cable was drawn tight by the sailors and made secure near the bow. This brought all the strain on the cable right down to the ship's nose, and caused the cable to act as an anchor chain. The boat swung slowly round, with her head to the wind. One engine was started astern, and the boat drifted slowly backward, dragging the great net over the bottom of the sea.

For ten minutes every man stood in his place in silence. The second officer watched the spring at the masthead. It was quivering and uneasy, now drawing out, now pulling back again, as the trawl struck a rock or stone heap on the bottom. The iron runners would lift it over fixed rocks, and smaller stones would be scooped up by the net. A man stood with his hand on the cable to ascertain by the feeling of the trembling wires whether it was sliding along easily or jumping and bumping over rocks. Every man stood watchful and anxious, for a big rock might catch the trawl, and every one must be ready to stop the boat and ease up the cable to prevent breakage. It was strange, fascinating work; but we could not stand watching it too long, for the zoologist called his guests to the main deck below.

Here the men of science found everything ready for their work. Hanging tables had been let down from the ceiling, and on these were soup plates and bowls filled with sea water. A wide door stood open at the side, just above the water. Then we heard the bell ring, and the boat stopped. Next we heard the rumble of the hoisting engine overhead, and a moment later the huge net was dangling in the air at the door. The end was hauled in on deck and opened, and out upon the deck poured a mass of stones, shells, and gravel, mingled with clams, crabs, both large and small, starfish, sea-urchins prickly with spines, sea-anemones, sponges, and fish of every kind and shape. A big flounder was picked up and sent to the ship's cook, and then the men of science gathered round the wet and wriggling heap and picked out the zoologic prizes. Every one engaged in the grand hunt for fish-life, turning the wet stones over in search of strange forms that dwell in the still, dark, mysterious place we call the floor of the sea. Millions of microscopic creatures that looked like bunches of brilliant color, golden browns and deep reds, rich greens and tawny oranges, were mingled through the flopping, crawling heap, and were quickly carried to the bowls, where they spread out like fairy plants in the clear water. Strange eggs and comic baby flounders, with their funny eyes all in the wrong place, and grinning skates flopped on the wet deck; but nobody seemed to care for common fishes. The search was for scarce and uncommon specimens or things that might be useful for study and investigation. One man wanted polyps for his museum; another wanted fish eggs for the study of embryology.

Meanwhile the steamer had steamed ahead for a mile, and the huge trawl was dropped again in the green water, and the boat drifted slowly backward, scooping up more treasures from the bottom. Four times the net was emptied on the deck and zoologic treasures were fished out of the tangled mass of shells and stones. Altogether over one hundred different kinds of fishes, shellfish, sponges, and other varieties of sea-life were counted, and the best examples were put in alcohol to be carried home to the museums.

This dredging was really in comparatively shoal water. The same trawl has often been used in water many hundreds of feet deep. In such deep sea dredgings strange, wonderful forms of fish-life are brought up from the eternal night that dwells under the Atlantic. The object of this trip of the Fish Hawk was to show to our little party of students and teachers of zoology how the United States Fish Commission studies the fish-life of our coast.

Naturally, it might be asked why the government keeps this expensive steamship in commission? Is it merely to let the zoologist poke about over the floor of the sea? That is precisely the point. Once we had abundant fisheries everywhere. Now fish are scarce and high. We give the zoologist a steamship and let him go fishing, because he is a man of science. He studies on this boat fish-life. He learns the secret of fish habits, their breeding times and places, their foods, and their enemies. He collects facts, and facts are money. Science deals with exact things—with things as they are. And from these facts he decides what is best for the fisherman to do. For instance, he learns that the smelt breeds in the early spring, and he says to the legislators, Pass a law forbidding any one to catch smelts in spring. Give the mother fish a chance to rear her family, and next year smelts will be plenty. You have been killing all the little mothers. It is no wonder the fish are scarce. He says that we must help the shad by artificial protection. We must raise millions of little fish, and then big fish will be plentiful again. The man of science maps out the floor of the sea, studies the supplies of fish food, studies the temperature of the water, points out in what seasons fish are plentiful. He studies fish-life that it may be more abundant and that we may not, as we have done in the past, waste the wonderful wealth that comes out of the sea.—The Outlook.

The Influence of Trifles.

Jefferson was fond of telling a story which illustrates in a forcible manner the importance that absurdly insignificant matters may sometimes assume. When the deliberative body that gave the world the Declaration of Independence was in session, its proceedings were conducted in a hall close to which was situated a livery stable. The weather was warm, and from the stable came swarms of flies that lighted on the legs of the honorable members, and, biting through the thin silk stockings then in fashion, gave infinite annoyance. It was no uncommon sight, said Jefferson, to see a member making a speech with a large handkerchief in hand, and pausing at every moment to thrash the flies from his thinly protected calves. The opinion of the body was not unanimous in favor of the document, and, under other circumstances, discussion might have been protracted for days, if not weeks; but the flies were intolerable. Efforts were made to find another hall, free from the pests, but in vain. As the weather became warmer the flies grew worse, and the flapping of handkerchiefs was heard all over the hall as an accompaniment to the voices of the speakers. In despair, at last some one suggested that matters be hurried so that the body might adjourn and get away from the flies. There were a few mild protests, but no one heeded them, the immortal declaration was hurriedly copied, and, with handkerchiefs in hand fighting flies as they came, the members hastened up to the table to sign the authentic copy and leave the flies in the lurch. Had it not been for the livery stable and its inmates, there is no telling when the document would have been completed, but it certainly would not have been signed on the Fourth of July.—New York Sun.

A New Electric Locomotive.

There is an electric locomotive in course of construction in Boston, Mass., which promises to meet all the requirements for propelling railroad trains. It is an eight horse-power machine and is unique. The distinctive feature of the invention, says the Boston Transcript, is the substitution of a piston and cylinder in place of the usual rotary power. The cylinder is much longer than for steam purposes, and has in its interior a series of magnets. The piston passes entirely through the cylinder, with crossheads at either end. On the piston within the cylinder is a series of armatures of peculiar construction.

On the axle of the driving wheels are commutators whose function is to apply and cut off the electric current, just as the eccentrics control the steam of a steam engine. The principle of the machine is the admission of the current to the magnets in the cylinder, which are in advance of the piston rod, and by their action on the armatures the pistonrod is moved forward. As the stroke is ended the current is cut off from the magnets first charged and applied to those at the rear of the piston, giving it a reverse motion, thus maintaining a strong, regular motion. There is absolutely no back pressure from the electric current, while in a rotary motor this is estimated at 20 per cent of the force applied.

It is practicable to run the machine at 200 revolutions of the axle per minute, and with a driving wheel 8½ feet in diameter, and the crank pin 3 feet from the center, there would be a 6 foot stroke under a full head of power. The machine is adapted to receive the electric current either by a trolley wire, a third rail in the track or from a storage battery.—Street Railway News.

Cramps in the Legs.

Unschuld calls attention to an early symptom of diabetes, which is seldom mentioned by writers on the subject but which is yet frequently found, and may assist in an early diagnosis of the affection. This symptom consists in cramps in the calves of the legs, and is found in about twenty-six per cent of all cases. The pains occur with especial frequence in the morning upon waking, and occasionally also during the night, when they are usually accompanied by a desire to urinate. They are rarely troublesome in the daytime, unless after a nap or a bath. Cramps of this nature, occurring in a person in feeble health, should always, Unschuld holds, suggest the necessity of an examination for sugar.—Med. Record.