The Manufacture of Needles.

From a lecture on "Steel in Modern Times," by Mr. S. Perissé, reproduced in a recent number of the *Revue Scientifique*, we take the following notes on the curious and interesting needle manufacturing industry:

The needle, says Mr. Perissé, passes through the hands of eighty workmen before it is ready to deliver to the trade; and, if we take into consideration that these articles cost at the very most only $2 per thousand, on an average, we find that the 8,000 operations are remunerated by the sum of 20 cents.

Owing to the progress effected in the art of drawing steel into wire, cast steel has been principally employed for some years past. Formerly, in France and Germany, manufacturers used iron wire, which was converted into steel during the course of the operation. The manner of manufacturing differs but little. At Borcette, the center of needle production of the continent of Europe, there are five series of operations involved in the manufacture: (1) Conversion of the wire into needles in the rough; (2) tempering and annealing; (3) polishing; (4) softening of the polished needles; (5) putting up into packages.

1. *The Conversion into Needles in the Rough* involves twenty operations, the principal ones of these being gauging the wire, cleaning, reeling, and cutting into pieces of a length equal to two needles. Sharpening or pointing is done by means of grindstones. By the aid of a leather thumbstall the workman holds fifty wires at a time. The latter become red hot by friction on the stone, and a constant stream of fine particles of steel and stone is thrown off, which formerly brought about phthisis in the workman after a time, but the adoption of powerful ventilators has now remedied all that. After pointing, the wire is cut in two, the head is flattened, and it is then annealed. Then the eye is punched in the head by means of a steel punch, the operation being performed by children in less time than it takes to describe it. Other children "hole" the needles, that is, remove the particle of steel detached by the punch. After this the heads are hollowed, sorted, and, when necessary, cemented.

2. *Tempering and Annealing* of the raw product requires nine operations, but they are performed with lots of 30 pounds weight, each containing more than 300,000 needles.

3. *Polishing* is the longest operation, although a million are polished at once. It requires five operations, each of which is repeated seven or eight times. The needles are put into rolling cylinders along with small hard stones and oil of colza. The stones gradually become crushed, and the friction of the particles during the motion of the rollers effects the polish. The last polish is performed with oil alone and coarse bran.

4. *The Sorting of the Polished Needles* involves five operations, and, after burnishing, which is a very delicate and important process and that which gives the luster, the needles undergo the last operation of being put up into packages.

IMPROVED HORSE HAY-FORK.

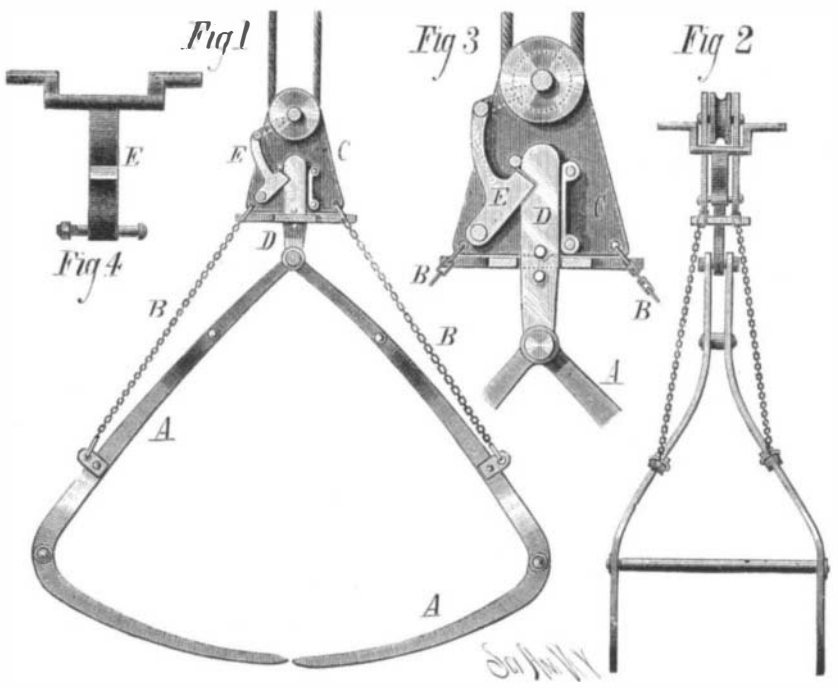
We give an engraving of an improved horse hay-fork recently patented by Mr. Townsend Albertson, of Mineola, N. Y. This fork, although very simple in its construction, is very convenient and easily managed, and is perfectly automatic in discharging its load.

The general form of the fork is shown in Fig. 1, and Fig. 2 is a side view, showing the double arrangement of the fork. Figs. 3 and 4 are detail views of the catch and releasing mechanism.

The fork tines are curved inward, as shown in Fig. 1, and are connected in pairs by a crossbar, as shown in Fig. 2. The shanks of the tines are hinged together at their inner ends, and connected with a catch, D, carrying a horizontal plate. The shanks of the tines, near the bends, are attached to chains. B, which are connected with the lower corners of the plates of the pulley block, C. The fork is raised and lowered and carried along by a rope that passes under the pulley in the block.

A latch, E, is pivoted between the plates of the pulley block, C, and is capable of engaging a notch in the catch, D, when the latter is pushed up into the pulley block. The latch, E, is provided with trip arms (as shown in Figs. 2 and 4), which engage with cleats or other stops on the track upon which the carriage runs.

When the fork is drawn back and lowered upon the load the tines are separated and supported by the chains, B. As the tines are thrust into the hay their curved shape causes them to move inward slightly, and the pulley block, C, is drawn downward so that the catch, E, will be engaged by the latch, E. When the pulley block is raised by the rope the load is lifted more or less by the catch, D, and when the load is carried to the point where the latch, E, strikes a stop and releases the catch, the load drops.



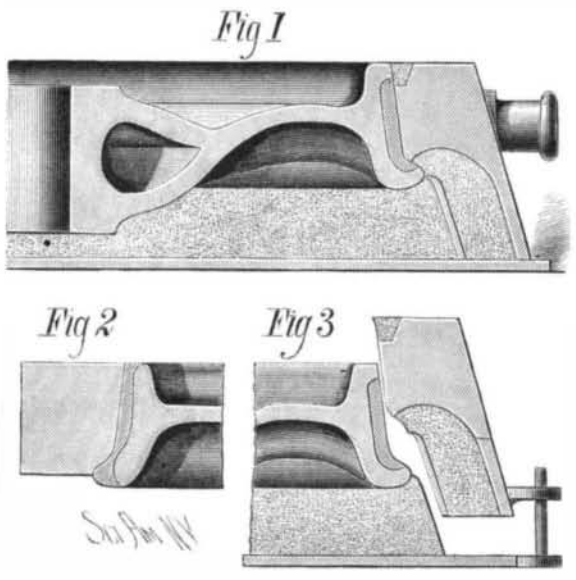
ALBERTSON'S HORSE HAY-FORK.

Lemon Juice in Diphtheria.

Dr. I. R. Page, of Baltimore, calls the attention of physicians, in the *Medical Record*, to the topical use of fresh lemon juice as a most efficient means for the removal of membrane from the throat, tonsils, etc., in diphtheria. He states that in his hands it has proved the best agent that he has as yet tried for the purpose. He applies the juice of the lemon to the affected parts every two or three hours by means of a camel's hair probang. In eighteen cases in which he has used the remedy the effect has been all that he could have wished. He finds that several of his professional brethren are prepared to give the same favorable account of the remedy.

IMPROVEMENT IN CASTING CAR WHEELS.

Considerable interest has lately been aroused among railway managers in favor of what is known as sand flange car wheels, and a great deal is claimed for them on account of their superior strength, durability, and largely increased mileage. All past attempts to make sand flange wheels have been mere experiments, and, as a rule, have been failures. It must, therefore, be inferred that the means heretofore employed for moulding them have not been satisfactory, and the results too uncertain to be appreciated or adopted by the practical wheel makers, many of whom have strong preference for sand flange wheels.



TAWCETT'S IMPROVEMENT IN CASTING CAR WHEELS.

Fig. 1 in the engraving is a section of the improved flask for moulding the flange of chilled car wheels in sand, showing the position of the flask when rammed full of sand. The inner or dividing ring, B, is made conical, and serves as a parting line for separating the two bodies of sand, and allows all the sand under the pattern to remain in the usual manner on the bottom plate, A, as shown in Fig. 3, and by its peculiar construction carries the sand that has been rammed on the upper side of the flange and holds the sand between the rings while the flask is being lifted off to allow removing the pattern and finishing the mould.

This form of a flask combines the best and most desirable features of construction, and is designed for long-continued regular work. This method of moulding insures neatness and cleanliness in carrying on the work and obviates the necessity of loose parts. Where economy in moulding, combined with accuracy in casting, is an object to be accomplished, this flask has been found very satisfactory.

Fig. 2 is a section of the ordinary chill, showing the chill in contact with the flange of wheel, and its effects on the rim of the wheel.

Further information in regard to this invention may be obtained by addressing W. Tawcett, Omaha, Nebraska.

Poteline.

The *Chronique Industrielle* states that M. Potel has recently communicated to the French Société d'Encouragement a new compound, which may be employed for preserving meat and hermetically sealing bottles, flasks, etc., or for making an artificial marble for the manufacture of various useful and ornamental articles. It is composed of glycerine, gelatine, and tannin. To preserve meat the inventor covers it with this new product, rendered liquid by exposure to a temperature of 90° to 100° C. The compound hardens very quickly and prevents access of air to the inclosed meat. When it is desired to offer the latter for sale the covering is simply torn off. The inventor has made many experiments during the past year, and has found that meat coated with the product could be kept from thirty to sixty days, and at the end of that time be apparently as fresh and sweet as any meat exposed for sale by butchers.

Sulphate of baryta or zinc white may be added to the compound to make it opaque, and it may be dyed of any desirable tint by means of ordinary vegetable colors when employed for ornamental purposes.

A Large Raft.

An unusually large raft of timber was recently floated down the Hudson. It was 900 feet long and 34 wide, and contained 254 pine logs, varying from 70 to 96 feet in length and from 18 to 30 inches in diameter. The logs were cut during the past winter in Ontario, Canada, near Capetown, Linden, and Onondaga. They were floated down to Toronto, on Lake Ontario, and on June 24 last they began their journey to Boston, in care of Capt. Edward Locke. They were made into a raft, and towed in three days and a half across the lake to Oswego, where they were separated into two rafts of six cribs each and a third raft of seven cribs. These were towed through the Erie Canal by John Wells, of Oswego. The journey occupied thirty-one days. The three rafts were then united into one large raft with two sections abreast, and floated down the river, traveling only on ebb tides. On its arrival at Gowanus Bay, Brooklyn, the raft was prepared for towing to Boston. The logs were chained together, and 113 logs from Pennsylvania were added, making a raft 1,300 feet long and 64 feet wide. The value of the raft was put at $25,000. The cost of towage $3,500, or one-third less than it would have cost to send the logs by rail.

Sensibility of the Telephone.

Every one knows that the very feeblest currents produce audible sounds in the telephone, which is more sensitive than any galvanometer to feeble currents. M. Pellat lately declared that the heat necessary to warm a kilogramme of water one degree would, if converted properly into the energy of electric currents, suffice to produce in a telephone an audible sound for ten thousand years continuously.

Carbon Electrics.

The galvanic properties of carbon have been closely examined by Dr. Hanichi Muraoka, a Japanese student at Strassburg. He determined the specific resistance and the change of resistance with increase of temperature of all kinds of hard carbon, including Siberian graphite, gas-retort carbon, the artificial carbons used for electric lighting by several well-known firms, and even the graphitic compound used in Faber's lead pencils. The specific resistance (at 0° C.) of the last was 952, while that of the first was 12·2. The artificially prepared carbons ranged from 36·86 to 55·15. In all, however, the resistance *decreased* with a rise of temperature, the coefficient of decrease being greatest for the Siberian graphite, least for a carbon pencil prepared from coke by Heilmann of Mühlhausen. This result entirely confirms the recent researches of Siemens and Beetz.

The thermo-electric powers of the various samples of carbon were also determined, with respect to that of graphite; their thermo-electromotive force was in every case + to graphite, and varied from 423 microvolts for the Faber pencil carbon to 9·26 microvolts for the gas retort carbon (of Parisian manufacture) used for battery plates.

A Railway on Stumps.

In the upper part of Sonoma county, Cal., a railroad track crosses a deep ravine upon the upright trunks of tall trees, which have been sawed off upon a horizontal line. In the center of the ravine a firm support is furnished by two huge redwood trees which have been lopped off seventy-five feet above the ground.

Sewing in a Boston Public School.

The Boston papers give favorable accounts of the recent exhibition in that city of the results of the instruction in sewing in the Winthrop School—a girls' school with six grades. In the three lower grades they have lessons of an hour each twice a week, and in the upper three classes once a week. The pupils furnish their own work, bringing the materials from home, the city having no expense except for needles and thread, in cases where the parents do not sup-

ply suitable sizes and quality. They are taught to sew in the best manner with rapidity; are taught the various stitches known to the artist in needlework; are taught to make every variety of children's garments under the outer, every variety of undergarments for ladies and gentlemen; all branches of dressmaking, cutting, and fitting with facility, all branches of needlework in tailoring; are taught the art of making and ornamenting table and bed linen, fancy work of endless variety, including fine lace work and embroidery. The exhibition of work was remarkably neat and tasteful, some of it being exquisite in design. The effect of the work upon the pupils is said to be excellent in every way.

Correspondence.

The Bell Telephone.—The Decision of Judge Lowell.

To the Editor of the Scientific American:

In a number of your late issues you have had some interesting articles on Judge Lowell's late decision in the Bell telephone suit against certain parties for alleged infringement. I have read the opinion of the court in the above case (published in SCIENTIFIC AMERICAN of August 27.) with much care, and desire to say a few words upon the same, as I view said opinion as not justified before an intelligent host of American inventors, thinkers, and writers. To be granted too much by such decisions brings our patent system into disrepute, as affording monopolies the power to control entire fields of useful invention. By careful examination of the field in dispute I realize that the desire of the Bell monopoly is to gain, by decisions of courts, the only right to use electricity to convey intelligence by vocal sounds. There is no fight over apparatus, no fight over the means employed to vary the current; the monopoly simply asks to have the current set aside for their use, whether said current is *undulated, vibrated, intermitted, pulsated,* or *disturbed.*

Now let us quote the most astounding part of said decision: "But Bell discovered a new art, that of transmitting speech by electricity, and has a right to hold the broadest claims for it which can be permitted in any case." It is a fact well known that many others in the same line of experiment, before Bell's patent of 1876, were in sight and in *hearing* of the desired result. They were all using a current, and were trying different plans of using said current, and had succeeded in a partial manner by *disturbing* a current of electricity. Mr. Bell found a more effective way of using the same current. Just as well give McCormick the only *right* to cut grass and grain because he did it better than any who worked before him.

By all means give Mr. Bell his every due—give him credit for being a persistent worker, and give him all he has invented; but it seems very inconsistent to confer on him the only right to use a vibrated or undulated current. Look at the facts: Reiss, Gray, Dolbear, and others, *prior* to Bell's patent of 1876, were working hard and strenuously with this old, *disturbed, varied,* and *vibrated* current, getting groans, music, and words out of it, and now all the hosts of electricians of our country are to see another step in and take away their old current.

What I desire is that each inventor shall fully be entitled to use what he invents and brings forward, and no more.

As the Bell telephone stands to day it looks as if it is next to impossible to obviate the permanent magnet, the induction coil, and current, but if some inventor can find a means of using electricity and its established powers in the transmission of vocal sounds, *in a manner and by apparatus not patented by any one else,* that an enlightened public sentiment and a high and honorable court of last resort should protect all alike. How will Mr. Reiss over in the old country, and in our own land of rights and liberty how will Elisha Gray, feel when that little current, so subtle, so uncontrollable, had finally been taken from him? How will my old friend Dolbear feel, too, after *varying* the current, away back yonder, years ago? In fact, what will be the wonder and surprise of the hundreds of intelligent professors who have in years and years been using intermittent currents and getting sounds and songs, when they learn that they are forbidden to undulate a current in any endeavors to make a machine which will talk at the other end of the line?

I hope to hear others speak out and give their views on this subject.

GRAVITY.

Fire from Milk Pans.

To the Editor of the Scientific American:

The house of Mr. Henry Goulding, of Dover, Mass., caught fire a few days since in a very original way. It was one of those days when the sun was "shining in his strength," that one of the family observed smoke issuing from the clapboards on the sunny side of the house, and on examination it was found that a hole several inches long had been burned entirely through the clapboards and inner boarding of the house (together at least 1½ inches thick), and a few minutes would have sufficed to render the destruction of the house certain, with the limited means at hand for extinguishing a fire.

A bucket or two of water served to remove all present danger, and on searching for the cause it was found in a pile of bright tinned milk pans, a few feet distant, one or more of which were so placed as to concentrate the rays of the sun upon a few square inches of space on the surface of the clapboarding of the side of the house.

We are all familiar with the story of Archimedes burning the ships of the enemy by reflecting the rays of the sun upon them; nevertheless there would have been another unaccountable fire but for the timely discovery of this freak of nature, or rather chance.

STEPHEN MOORE.

Newton, Mass., August, 1881.

Temperature Observations in the Comstock Mines.

Recent temperature observations at Virginia City, Nevada, show the heat of the Foreman shaft to increase with the depth as follows:

Depth.	Temperature.
100 feet.	50½ degrees.
200 "	55 "
300 "	62 "
400 "	60 "
500 "	68 "
600 "	71½ "
700 "	74¾ "
800 "	76½ "
900 "	78 "
1,000 "	81½ "
1,100 "	84 "
1,200 "	89¼ "
1,300 "	91½ "
1,400 "	96½ "
1,500 "	101 "
1,600 "	103 "
1,700 "	104½ "
1,800 "	105½ "
1,900 "	106 "
2,000 "	111 "
2,100 "	119½ "

The temperatures were ascertained by drilling at the successive levels holes not less than three feet deep into the rock, and inserting a Negretti and Zambra slow-acting thermometer (of the pattern adopted by the Underground Temperature Committee of British Association, and standarized at Kent) into the hole, closing the hole with clay, and leaving the thermometer for twelve hours—not less than three holes being tried at each point.

Commenting upon these results the Virginia City *Enterprise* calls attention to the circumstance that though there is on the whole a steady increase of temperature as depth is attained, the increase of temperature is not regular. For instance, the rock at the 400 is two degrees cooler than at the 300 level; between the 400 and the 500 levels there is a difference of eight degrees; while in other places an additional depth of 100 feet shows but a slight increase in the temperature. Thus at the 1,800 level the temperature is 105½ degrees, while at the 1,900 it is but 106 degrees, an increase of but one-half a degree. This difference is undoubtedly owing to the character of the rock at the points where the holes were made; therefore it would be of great interest to have, in connection with the temperature, a description of the rock; not only the kind of rock, but also the nature of the same, whether carrying much lime, gypsum, or iron pyrites. It would probably be shown that where there was much lime there would be an increase of heat not warranted by the increased depth, and the reverse where lime was absent.

A Peculiar Property of Gutta Percha.

It is a well-known fact that when gutta percha is placed in water having a temperature of 60° to 70° C., it becomes very plastic, and may be used to receive very delicate impressions. Not so well known, however, is the information that the softened gutta percha becomes very elastic toward severe shocks, that it will bear blows from large hammers, and allow itself to be thrown against a strong wall without showing any indication of the result, while at the same time it is so susceptible to gentle pressure that it is capable of receiving the slightest of impressions.

This peculiar property is possessed by other plastic bodies, though in a less degree, as, for instance, freshly kneaded bread. It is considered as resulting in consequence of the occluded air contained in the substance.

The following simple experiment demonstrates the correctness of the above suggestion: Two spheres of equal weight are made of gutta percha which has been softened in water at 70° between the palms of the hand. One of these is placed on a card, and the air removed from the sphere by exhausting it under the receiver of an air pump; the other is retained for comparison. Both spheres, from their weight, will assume the form of round cakes, but the one under the air pump will swell considerably and exhibit a wrinkled surface. The increase in volume often more than doubles its original size. If the swollen piece is permitted to harden under the receiver of the air pump and then broken with a chisel, its cross section will appear honeycombed like the interior of a loaf of bread, while the fracture of the other piece will only show small cavities. Very dense gutta percha does not swell under the air pump, but if placed under mineral oil and made empty a voluminous evolution of air from the gutta percha will take place.

After the air is again admitted under the receiver it will be found on examining the gutta percha that it has lost the property of hardening on cooling. It has become like tough greasy leather. A voluminous evolution of air was also observed when clay, putty, and kneaded bread were examined under oil in vacuo similar to the above-described treatment of gutta percha.

The same phenomenon was observed when a sample of gutta percha, which had been softened in an air bath, was treated as above; in this case a longer time is required for the heating, as the heated air is very slow in giving the amount of required heat.

With some bodies the inclosed air plays an important part in affecting its mechanical properties; thus, clay, for instance, may be somewhat compressed by means of a piston in a cylinder, but as soon as the pressure ceases it resumes its former volume.

The densest of clay when placed under the air pump will become covered with numerous fine crevices (small as a hair), which close when the vacuum is sufficiently reduced.—*F. Kick, Dingler's Polytechnis. Che. Journal,* 240, 363.

Danger in the Westward Traffic in Calves.

The recently appointed Treasury Cattle Commission, sitting in Chicago, have just issued the following circular, addressed especially to the Governors of the States and Territories west of the Alleghanies:

The Treasury Cattle Commission, appointed by the Secretary of the Treasury in pursuance of an act of the last Congress, deem it their duty to call your attention to the imminence of the danger to which herds in the States and Territories west of the Alleghanies are exposed from the traffic in dairy calves, which is becoming a very common one between these States, now happily exempt from the contagious pleuropneumonia of cattle. That a very large proportion of our country has up to this time remained exempt from the dangerous malady, is owing chiefly to the fact that the current of our cattle traffic has hitherto been mainly from the West toward the seaboard. But the business of purchasing calves from the Eastern dairy districts, and scattering them throughout the Western States and Territories, which has within a year or two past assumed such mammoth proportions, has augmented the danger to which the uninfected districts are exposed tenfold; and if it is permitted to go on unchecked, the danger of a general infection of the great cattle growing and grazing regions is imminent. We therefore call upon you to use whatever influence you may legitimately bring to bear upon the people of your State to discountenance and discourage a traffic that is fraught with such danger to their material interests. The district known to be infected with the scourge embraces pretty much the whole of the country bordering on the coast from New York city southward to Washington, and extending to a greater or less distance inland. But the Commission would recommend that, until a more thorough examination can be made, and a complete isolation of infected herds be secured, every possible means that can be legitimately resorted to should be brought to bear to discourage and prohibit traffic in cattle from anywhere near the infected regions.

An Illuminated Buoy.

For some weeks the Pintsch Lighting Company has maintained a lighted buoy off Sandy Hook. The buoy is hollow, five feet in diameter at the water line, and is filled with compressed gas, enough, it is said, to supply for thirty-five days a light which is visible six or seven miles. The "Pintsch" gas used is made from fat, paraffine refuse, shale oil, grease, or any similar substance. It is compressed in retorts, and is carried out to the buoy when needed. The owners assert that this gas is far safer than coal gas, is one-third cheaper, and can be compressed in a far smaller space than coal gas. A patent regulator, devised to insure a steady flame whether the pressure in the buoy is high or not, consists of a cast iron conical vessel, about twelve inches in diameter and six inches high, the upper part of which is closed by a gas-tight membrane, to the center of which is fastened a rod with a movable joint, and this again is connected with a lever attached to a special valve, which opens to a greater or less extent according to the pressure on the membrane, and the light remains clear and steady notwithstanding the tossing caused by heavy seas. A device for lighting the gas of such a buoy by electricity was patented by the company; but the cost of the gas is so small that it was deemed best to use as little machinery as possible, and this device was given up. The refilling of the buoy at certain intervals is done by a tender. Gas from the tender's tank at a pressure of ten atmospheres is allowed to fill the buoy to a pressure of six atmospheres by means of a rubber tube. The buoy is built without rivets, the body forming a compact wrought iron vessel.

The company claim that such buoys have been tried satisfactorily in England, Russia, and Germany, the cost of the light being only ten or twelve cents a day.

The electric buoy that was put at Sandy Hook last summer drifted away and was picked up at sea by a Dutch vessel and carried to Antwerp.

A Fish Hawk's Nest in a Channel Buoy.

The iron spindles which work the reefs in Long Island Sound are made with globular heads or basket shaped tops so as to be clearly seen. The spindle that warns vessels of the location of the end of Groton Long Point Reef, near Watch Hill, has a top shaped like a grocer's bushel basket. Some years ago a pair of fish hawks carried cornstalks and straw enough to this spindle to nearly fill the basket, and adopted it as their home. The same birds, apparently, have continued to occupy the spot, and the female has just hatched out a new brood. It is seen circling about the nest at the approach of nearly every vessel. The winter storms usually shatter the nest, but the birds repair the damage every spring.