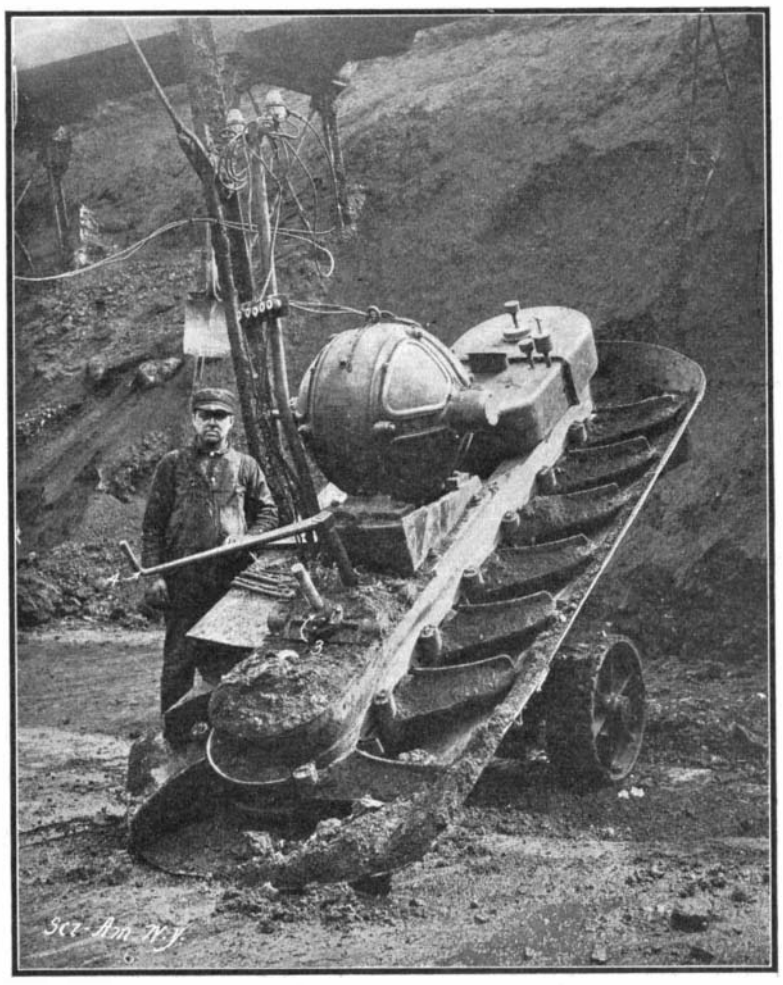
AUTOMATIC ORE LOADER.

The accompanying illustrations of an automatic ore loader present an interesting case of the substitution of automatic machinery for hand labor. They represent a movable automatic loader, which is used at the furnaces of the Illinois Steel Company at South Chicago, Ill. It is shown backed up to the great ore dump that ranges parallel with the blast furnaces, where it is engaged in loading the iron wheelbarrows in which the furnace charge is wheeled to the charging buggies at the foot of the elevators. The machine, which is built by the Park Manufacturing Company, of Chicago, consists of an endless chain of metal scoops which are mounted on a stout metal table, the table itself being mounted pivotally on a truck, to enable it to adjust itself to the pitch of the ground and the height to which the material is to be elevated in loading. The chain of scoops, which is driven by an electric motor, passes around sprockets arranged at the opposite ends of the machine. By means of chains, sprockets, and suitable clutches, the electric motor also serves to propel the loader, moving it to any desired point of the yard. This particular type of machine has been tested successfully in the handling of limestone, coal, and salt, and it has shown a considerable saving of time and money in loading over hand labor with a shovel. The capacity of the machine is 90 cubic feet per minute of loose material.

The control of the loader is arranged so that the operator can handle the machine conveniently from the right-hand side of it, as shown in the illustration. Conveniently to hand there is a main clutch, 1, for operating the scoops or "flights," while adjacent to that is a lever, 2, for throwing in the propelling clutches. At the front end of the machine is a screw, 3, for adjusting the height of the forward edge of the machine. No. 4 is a steering lever, used when transferring the loader from one place to another. There is a cam arrangement upon the driving wheel, by which, when the front wheel is turned, a clutch on the inside wheel is withdrawn, making the outside wheel a driver and rendering it possible to turn the machine end for end in its own length. The loader can also be mounted on a truck provided with flange wheels, and used in mines or in tunnel work, in which respect it shows to good advantage. If it is desired, a secondary conveyer is provided, which serves to elevate the material to a height of 10 feet or more for discharging into railway cars or wagons, the 10 horse-power of the machine being found sufficient to enable the loader to haul its own secondary conveyer with it. The average capacity of the machine illustrated is 90 cubic feet per minute of loose material.

The method of operation of the loader is clearly shown in the engravings. The front edge of the table is lowered until it rests upon the ground, and it is thrust forward against the bottom of the pile of material. As the arms sweep around, each gathers a certain amount of the material, carries it into and up the carrying channel, until it reaches the upper end of the machine, when it is delivered, as shown, into the desired receptacle. As the arms travel at a rate of 60 to 80 feet per minute, and the carrying channel is 18 inches wide, by 16 inches deep near the inner wall of the channel, there is an actual carrying capacity of 1½ cubic feet for every foot of travel of the chain; or say, from 80 to 100 cubic feet per minute.



3. Screw for raising and lowering front of machine. 4. Steering lever.

AUTOMATIC ORE LOADER. FRONT VIEW.

Novel Method for Entrapping Submarine Boats.

During the recent naval maneuvers of the British Channel squadron off Portsmouth, a novel method of entrapping and disabling submarine boats was attempted, and the efforts were crowned with complete success. The submarine boats were attached to the squadron acting as defending vessels, and their object was to frustrate onslaughts and put out of action the attacking battleships.

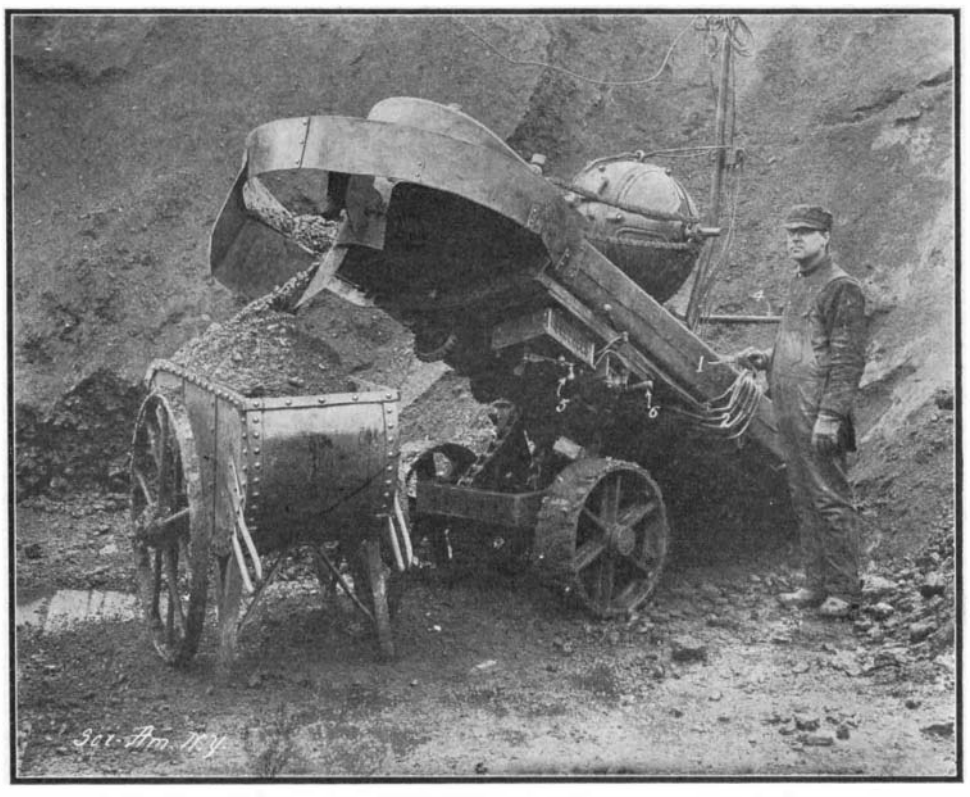
The larger armorclads of the attacking vessels kept well out to sea, and confined their efforts to firing upon the forts from long range. The torpedo boats and other similar lighter craft, however, rushed to the attack. While this movement was in progress, and the undivided attention of the defending force attracted entirely thereto, the battleships of the enemy quietly dropped picket boats, manned with full crews. These craft are small, light, mobile, and easy to handle, though they can steam at from sixteen to eighteen knots an hour. Their scope was to destroy the submarines, and for this work they are admirably suited, for they are inconspicuous, offer a small target, and are speedier than the submarines, which only travel about ten knots on the surface, and six or seven knots when submerged. Moreover, submarines travel only from ten to twenty feet below the surface.

Each picket boat was equipped with some fine nets of specially fine hard steel. When expanded, they stretched to 70 feet or 100 feet in length, and were fairly broad. Along one side of each net a hawser was threaded. One end of this hawser was attached to a compensating drum on one picket boat, and the other end was fixed to a similar arrangement on a second picket boat. The net thus rigged at once sank down like a thin wall into the water.

Owing to the fine, delicate construction of these nets, they can be dragged through the water like a fisherman's sieve by the picket boats at a pace far in excess of that of a submerged traveling submarine. This curious process of fishing, or trawling, for submarines was eminently successful. Officers on the picket boats attached to one of the nets saw a periscope moving on the surface of the water. They immediately maneuvered their boats so that the steel net was stretched across the submarine's path. The submerged boat continued its progress, unsuspectingly. In a few minutes the officers in the picket boats at either end of the hawser felt a straining, which told them that they had stopped the career of the submarine. Immediately the boats altered course, so as to completely envelop the unfortunate underwater craft in the net. The maneuver was crowned with absolute success. The submerged craft was completely caught.

To accentuate further the predicament of the sailors in the submarine, the hawser carried away the periscope, so that the navigators of the submerged craft were deprived of their sole means of seeing what was happening on the surface, and consequently the crew could do nothing but await developments. By some means or other the picket boats contrived to raise the submarine to the surface, and its capture was completed.

The success of this experiment opens new possibilities of frustrating the attacks of submarines, if not capturing them. It was conclusively demonstrated on this occasion that once a submarine is enveloped in the meshes of such a net—it must be very fine and strong—it is impossible to escape, and the boat is as helpless as a fish under similar circumstances. The destruction of the periscope, too, as this instance proved, completes the helplessness of the submerged boat. If the submarine cannot be raised or forced to the surface and then captured, the picket or other boats have simply to stand by and await until the need of a fresh supply of air forces the vessel to rise, when its capture can be effected.



1. Main clutch. 2. Lever for propelling clutches. 5. Starting box for motor. 6. Circuit breaker.

AUTOMATIC ORE LOADER. REAR VIEW.

The Submarine and the Searchlight.

In Narragansett Bay on the evening of November 11, there was an elaborate test to determine the usefulness of submarine boats in naval warfare, the purpose being to see if they were less visible at night than surface boats, if they could be navigated successfully and safely in the dark, and if the playing upon them of numerous searchlights hampered the making of observations from their conning towers.

The test partook of the nature of a sham battle, in which Fort Adams and the torpedo station, with strong searchlights and large parties of army and navy officers acting as observers, and the tug "Peoria," anchored west of the torpedo station and using a powerful searchlight, were opposed to the submarine boats "Moccasin," "Adder," and "Plunger" and the surface boats "McKee" and "Morris," as well as "Torpedo Boat No. 1."

Of the six craft afloat, the "Adder" alone lived through the battle, and she succeeded in eluding all the watchers and getting into a position so close to the tug "Peoria" that she easily could have annihilated her. It was, in fact, a clean-cut victory for the "Adder," which was in command of Lieut. Frank L. Pinney. The watchers at Fort Adams picked up with some little difficulty the submarine boats "Moccasin" and "Plunger," and they searched in vain for the "Adder."

It was learned that the navigation of submarine boats in the dark was practicable, and that the playing upon them of powerful searchlights did not much hamper their officers in running them or making observations from their conning towers fairly well. When the light was not playing upon the boats, very good vision could be obtained from the submarines. It was proved that the submarines were less visible in the dark than the surface boats.

Rotary converters operated six-phase will give from 35 to 45 per cent greater output than when operated three-phase, according to an article by Mr. A. S. M. Allister in the American Electrician. Hence economy dictates three-phase transmission, with transformation to six-phase at the converters. The simplest method is to use three transformers, the primaries being either star or delta connected and the secondaries star connected. A delta connection on the low-tension side, as well as on the high-tension side, has, however, the advantage that the breakdown of one transformer does not render the plant useless, as the two remaining transformers take the load of the missing one.