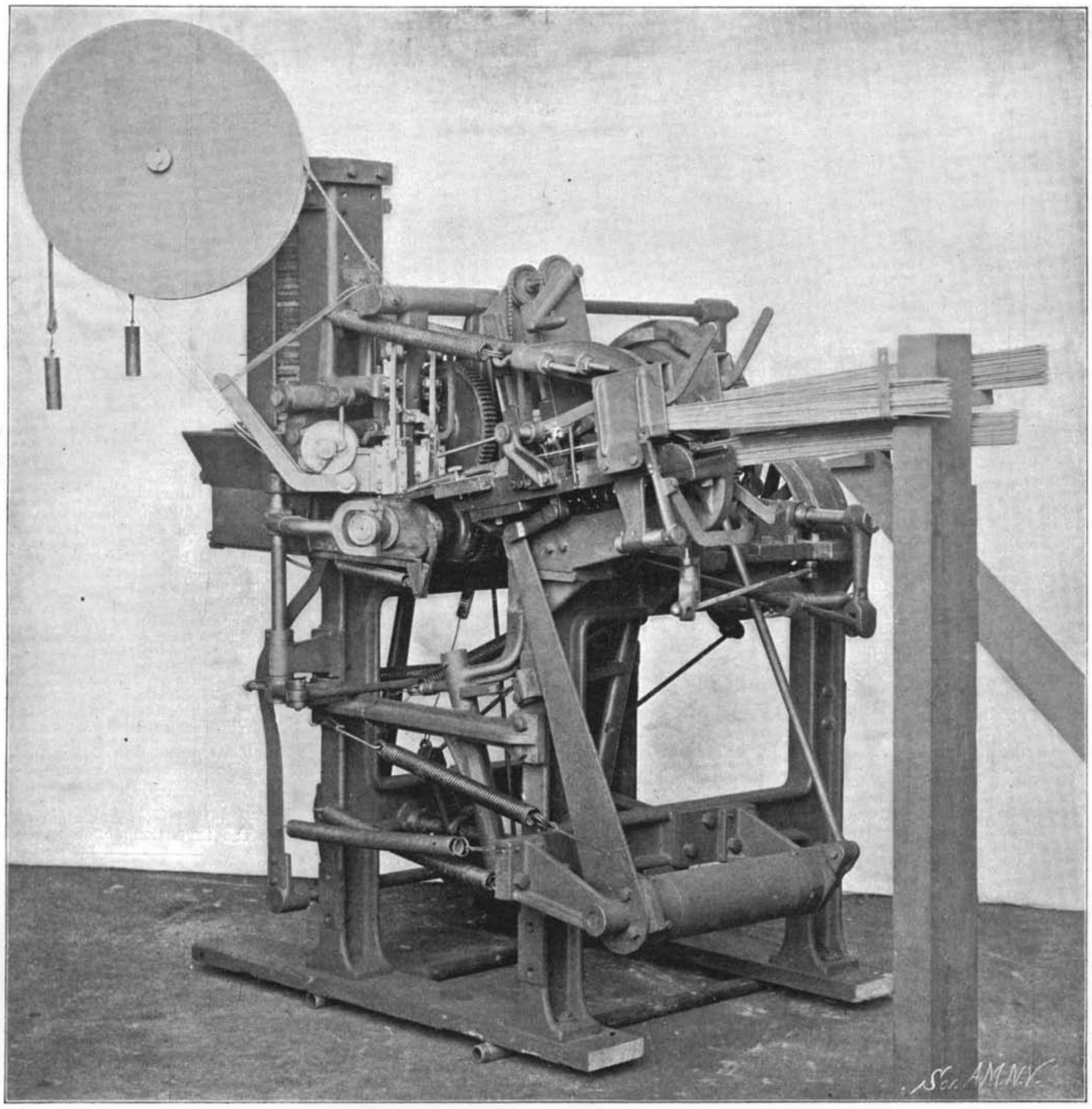
was received, and on January 20 a quotation was sent to England. Four days later the company received the order for the bridge and the specifications. Two days later a change of the span length was ordered, and on the following day, January 27, the stress sheet was completed. In ten days the shop drawings were finished and all material ordered, and on February 6 work was started in the template and bridge shops. March 7, just a month later, the entire structure was shipped from the Pencoyd Works, in spite of the fact that seven days were lost on account of the closing of the shops during a blizzard. The entire time from receipt of final data to date of shipment was forty days, or two days within the contract time. Excluding the seven days lost on account of the blizzard, and four Sundays, we find that only twenty-nine actual working days were consumed in working out the design and details and building the structure ready for erection.

Although the designing and manufacturing of the bridge was a very rapid piece of work, it is not so difficult a feat as it was considered to be in England. The capacity of the Pencoyd Bridge shop ranges from 5,000 to 6,000 net tons per month. On the basis of 5,000 tons per month, the 750 tons comprising the whole contract represent only about four days' work for the entire shop. The erection crew left New York April 22, and reached Atbara June 16. A little over two months later, August 19, the bridge was finished; that is to say, within seven months of the date of the placing of the contract. The shortest time occupied in erecting any one span was four days. The merit of this work, considered as an engineering performance, was acknowledged by General, now Lord Kitchener, in his address at the formal opening of the bridge. He said: "The opening of this bridge is due to their [i. e., American] energy and ability and the power they possess in so marked a degree of turning out work of this magnitude in less time than it can be done by any one else. I congratulate the American foremen and workmen on the excellent success which has crowned their efforts in the erection of this bridge in the heart of Africa, far from their homes, during the hottest months of the year, and dependent solely on the labor of men speaking a foreign tongue. They have shown by their work the real grit they are made of."



MERGENTHALER GRAPE BASKET MACHINE.

Consul Bergh, of Gothenburg, writes: The Göteborgs Mekaniska Werkstads Aktiebolag, of this city, intends to build a drydock for vessels 490 feet long and of 25 feet draft, or from 6,800 to 8,000 tons displacement, and has applied to the government for subsidies. If this dock is built it may to an extent promote the establishment of direct transatlantic steamship communication. The present drydock is not large enough for ocean steamers of largest size.

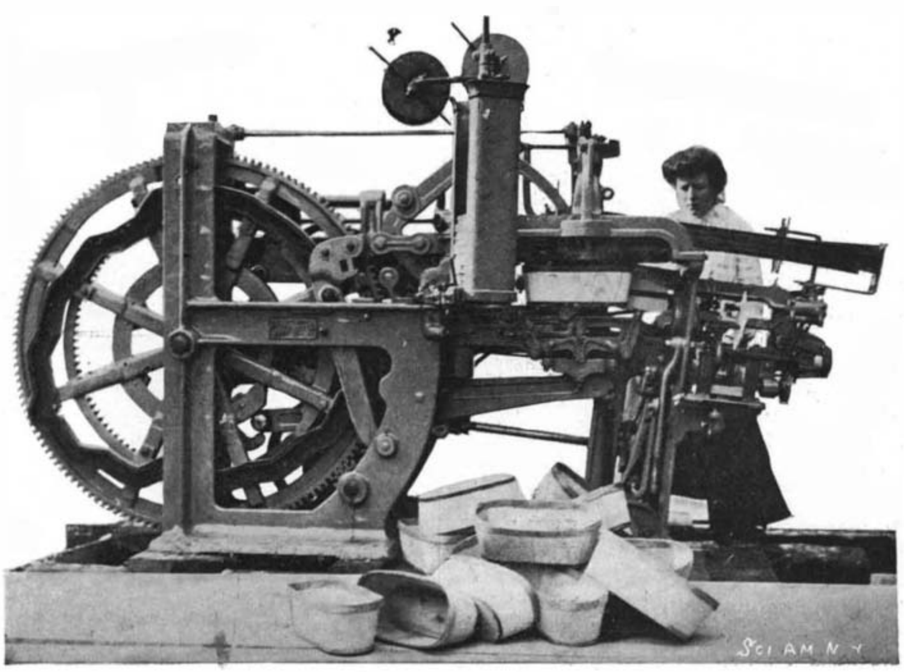
THE MERGENTHALER-HORTON BASKET-MAKING MACHINERY.

It has been one of the peculiarities of the fruit industry of the United States that the makers of baskets have found it difficult to cope with the overwhelming orders of the fruit-growers. This unfortunate peculiarity has been due primarily to the fact that all fruit-baskets used in America have been produced by hand.

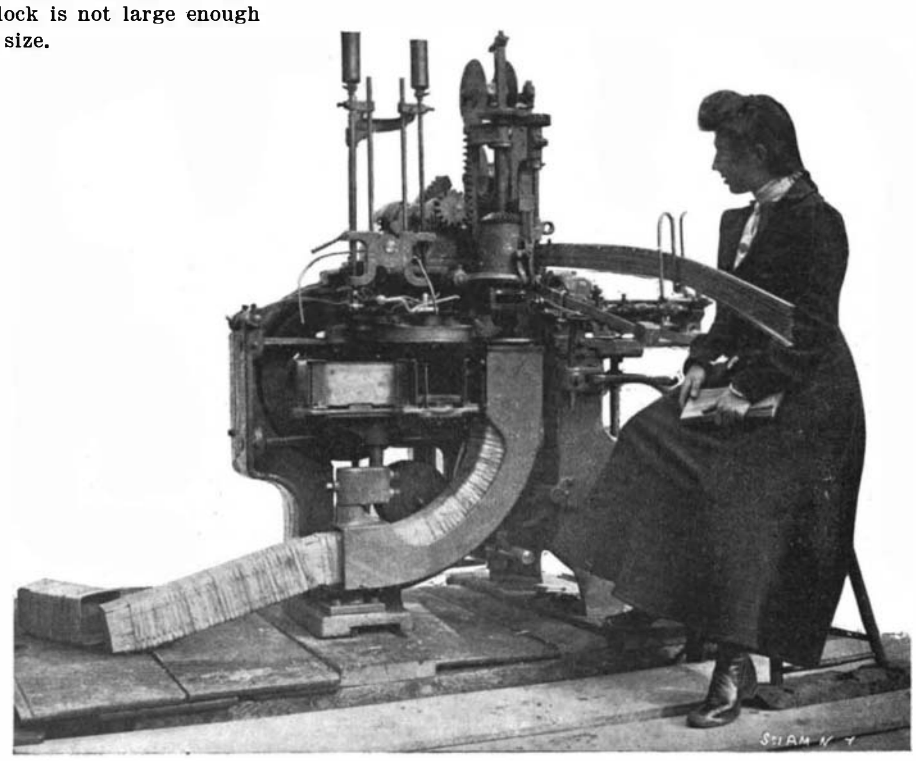
In 1894 a machine was patented by Mr. Emmet Horton, which was the first practical apparatus for the mechanical making of baskets. Horton did not stop with the invention of a solitary labor-saving device. Continuing his work, he devised improvements, simplified complex constructions, increased the operative efficiency, and at last produced a machine that could turn out more baskets in an hour than could twelve skilled basket-makers under the old system. When it is considered that the machine can be operated at a cost less than the wages of a single workman, that the baskets are produced as rapidly as they can be counted, and that they are better and stronger than those made by hand, the industrial possibilities of such a machine are evident.

In later years, Mr. Horton was associated with Ottmar Mergenthaler, whose name will ever be linked with the famous linotype machine. These two inventors produced the machines shown in our illustrations, now made by the Mergenthaler-Horton Basket Machine Company of 287 Broadway, New York city. The present article will be devoted to a general description of three types of machines now in use, two of which serve for the making of grape baskets, and the other for the making of berry baskets.

The berry-basket machine is to a very large extent the product of Mr. Horton's genius. It is a mechanical



HORTON GRAPE-BASKET MACHINE.



HORTON BERRY-BASKET MACHINE.

substitute for human fingers, but almost immeasurably more efficient. The sides and bottom of the berry-baskets are formed of crossed veneers or sheets of suitable wood of appropriate shape, which veneers or sheets are bent into shape by forming mechanism and secured at their edges by a wrapped band lying inside and outside the edges, properly nailed or stapled. The novel features of this particular machine are to be found in the mode of operation and in the bringing together of the blanks and forming mechanism in order to produce a completed basket. The blanks are bent by means of a form and a die. The form is axially movable, and intermittently rotative; the die is rotative and laterally movable. In order to receive the blank, the die is moved laterally away from the form. While the die is so removed, the form is rotated through three-fourths of a revolution to wrap a band, which has been applied to one side, around the remaining three sides of the form. Thereupon the die is returned opposite the form, the form is caused to move axially into the die to fold the blanks upon it, and is thereafter successively partially rotated, while the band is wrapped and nailed, and further moved axially after the die has moved laterally away from it, to deposit the basket in a receiver. All that now remains to be done is to staple the basket, which is done by a bottom nailer and a side nailer. The bottom nailer is laterally movable, and co-acts with the laterally-movable basket-receiver, in which the completed basket is deposited by the form. As the receiver is moved from opposite the form, the nailer is moved opposite the form, a nail is driven into the bottom of the basket, the nailer is moved away, and the receiver is again brought into position in order to receive the completed basket. During the three-fourths revolution to which the form is subjected in order to wrap the band, a nail is driven into the band at one side of the basket. The basket is then successively rotated through one-fourth of a revolution at each step, the side of the basket being nailed after each fourth of a revolution. The completed baskets are received in a curved basket-receiving chute in which they are deposited by the form, and which delivers them nested to the base of the machine. This brief outline of the mode of operation, brief because of the limited amount of space at our disposal, will give a general idea of the ingenuity of the construction.

One of our illustrations pictures a grape-basket making machine, the parts of which are also automatically secured together by staples, which are automatically formed and driven as the operation of assembling the parts progresses.

The blanks for forming the sides of the basket are taken one at a time from a magazine by a "picker," which delivers them to a "holder." From the holder the blanks are taken by a "gripper" and carried to a form, about which they are assembled and secured to other parts of the basket. The "gripper" consists of two jaws which are automatically opened and closed at the proper time and which are moved back and forth between the sides-holder and the form. Provision is made for opening the jaws either automatically or at the will of the attendant. The bottom pieces are fed from a bottom-supply receptacle or magazine which is made adjustable for different sizes of bottoms, and which is so supported that it will move out of the way should it be subjected to excessive pressure by an improper operation of the crane. The picker is so operated that it moves quickly and positively when in the act of picking up a side piece, but more slowly when moving with a blank from the sides receptacle or magazine to the grippers, so there is sure to be no liability of moving more than one side piece at a time, and danger of dropping the side is avoided. Guides are provided to direct the sides so that they are evenly bent around the form. The band-feeding mechanism is of simple and novel construction. The inner ends of the bands are arranged in gangs or bunches on supports, disposed at an angle with reference to the axis of the form. Where the form is arranged on a vertical axis, the supports for the inner ends of the bands are made horizontal, and on them the bands are arranged to lie edgewise vertically. Feed-screws are mounted on a horizontal axis in such a manner that they enter between the bands, separate them and deliver them, one at a time from each bunch to a chute, through which they pass to the form adjacent to the stapling mechanism. The stapling mechanism feeds the wire, cuts it into proper lengths, bends it to form staples, and drives the staples into the basket.

Mr. Mergenthaler's grape-basket machine differs somewhat in principle from the basket-making machines invented by Mr. Horton. Instead of storing the bottoms in a pile from which the gripping-jaws of the crane carry them to the form, and swing them to the form, Mr. Mergenthaler achieves the same results by disposing the bottoms in a magazine, across the lower end of which reciprocates a slide that delivers the bottoms, one at a time to a narrow chamber. This narrow chamber holds the bottoms vertically in line with the end of the form, which is mounted on a horizontal axis. The upper end of a feed-lever provided with clamping devices reciprocates through the narrow chamber and moves each basket into position in front of the form, where it is taken by another lever moving at right angles to the feed-lever and pressed against the end of the form, to be held there during the making of the baskets. The sides are fed from their magazine by a slide to a pocket in line with another slide, by which they are moved upon a table, from which they pass to the form. The slide, whereby the sides are fed to the form, also feeds the bands. Sometimes it is desirable that the sides be made slightly to overlap in the completed basket; and devices are employed to cause the side pieces to overlap while they are being secured together. The bands are held in stacks in separate compartments of a magazine from which they are delivered laterally to a slide, which transfers them to guides from which they are taken by another slide. Reciprocating toward and from the form, this latter slide feeds the bands to the form. As the bands are fed forward, a side-piece is taken up by the slide, which delivers it with the bands to the form. Enough side pieces are fed to the form by the slide for completing a basket without feeding the bands by the slide, for the bands are drawn forward without being actuated by the slide, after the first side piece has been secured to the bands. As in the Horton machine, the staples are made from a continuous length of wire and driven into the stock, immediately after being formed. Since the stapling mechanism moves with the form during the operation of driving a staple, considerable speed is gained in constructing the basket. So far as the driving mechanism is concerned, attention should be called to the fact that no mutilated gears are used. For the most part, the working elements are driven by the cams of a single cam-shaft, which actuates levers connected by rods with the parts to be operated. Some few parts, however, are driven by spur-gears or by ratchets, the whole being so constructed as to operate smoothly and without material interruption.

A single grape-basket machine of the best type produced by the Mergenthaler-Horton system is capable of making 4,000 complete grape-baskets in a day. A single berry-basket machine can produce 12,000 complete quart berry baskets in a day, or in other words, 20 baskets a minute. When it is considered that 2,000,000,000 baskets are annually required to hold the grapes, berries and peaches of American farmers and fruit growers, the importance of the saving of labor in the manufacture of baskets is manifest.

Marconi's Latest Feat.

Following hard upon the transmission of the letter "s" from Cornwall to Newfoundland by wireless telegraphy comes the news of the transmission of entire messages for a distance of 1,551 miles.

On board the steamship "Philadelphia," bound westward, Marconi made a series of experiments, the purpose of which was to determine at exactly to what distance it was possible for his station at Poldhu, Cornwall, to transmit an intelligible message. He asserts that at a distance of some 1,551 miles he received distinct communications, and that simple signals were perceptible at 2,100 miles. Those who were skeptical when the news was first spread last December of transoceanic signaling will have but little to criticise in the latest performance of Marconi. The officers of the "Philadelphia" and the tape of the recording instrument fully corroborate the statements of the inventor. In Newfoundland Marconi had received the sound of the signal "s" through a telephone receiver, so faint was the ticking of the instrument; but now he can exhibit ribbons of paper bearing the messages sent from Cornwall up to a distance of 1,551 miles, and after that the signal letter "s" to a distance of 2,099 miles.

The "Philadelphia" sailed from Cherbourg on Saturday, February 1, at 6 P. M. Two hundred and fifty miles west of Poldhu the first experimental message was received, which read, "Stiff southwest breeze. Fairly heavy swell." That same night, when the "Philadelphia" was 500 miles off Cornwall, a second message was received, reading, "All in order. Sign. Do you understand?" Both of these messages the chief officers of the ship signed. On the 4th, when the "Philadelphia" had passed the 1,000-mile mark of her voyage, the captain and first officer of the vessel received a message, "Fine here. Thanks for telegram." The following morning saw the receipt of a fourth message, when the "Philadelphia" was 1,163 miles west of Poldhu. It read, "May every blessing attend you and your party." The fifth message, which was the last that came in words, was received on the same day, and its import was somewhat similar to that of the second. After the receipt of the fifth message the letter "s" was telegraphed by the operator at Cornwall merely to inform those on board the vessel that the station was still at work. Finally, when the liner had passed the 2,099th mile, the tests were stopped. The messages mentioned were only a few of those actually received. Communication was kept up almost constantly; but it was deemed unnecessary to submit to the public more than half a dozen signed tapes.

Marconi, it is said, hopes to succeed in transmitting messages commercially across the Atlantic during the coming three months. The European station will probably be continued at Poldhu; on the American side two stations will be used, one at Cape Breton and the other at Cape Cod. In order to send and receive messages it will be necessary to build towers of sufficiently substantial construction to withstand the fierce gales that ravage the eastern coast of North America. The instruments are to be of the latest type and of the highest power yet used.

The receiver of the "Philadelphia" was not constructed for long-distance work. For that reason it was capable merely of receiving, not of sending messages. The success obtained may be fittingly termed a triumph for Marconi and for his system.

At the present time wireless telegraphy has been of service chiefly in placing steamships in communication with one another. Both in the merchant marine and in the navies of the world we may soon expect to see a rapid development and a more general introduction of the Marconi system and as well as of its European rivals. That wireless telegraphy will sooner or later become a formidable competitor of the submarine cable seems fairly certain; but whether it will ever supersede land telegraphy is a question open to some discussion. Wireless apparatus is so much costlier than the simple Morse instruments commonly used that, despite the necessity of using wires and poles, it is doubtful whether communication on land will be seriously modified for many a decade to come. Furthermore, it must be remembered that the speed of transmission by the Morse system is far higher than that which has so far been obtained by ethereal telegraphy. The quadruplex systems of telegraphy which have been introduced in late years have increased the speed of transmission by means of wires to an enormous extent. Many sets of Marconi instruments would be required to send the messages which are carried by a single wire in a quadruplex system. But after all is said and done it cannot be disputed that a new method of communication has been devised which promises to be fully as important as the inventions of Bell and Morse.

The English Cruiser "Spartiate."

An unprecedented event in the annals of the English navy has been the delay in the construction of the new cruiser "Spartiate." This vessel has occupied no less than four and a half years in building. She is one of the first-class cruisers authorized in March, 1896. She was laid down at Pembroke Dockyard just before the great engineering dispute which paralyzed the shipbuilding industry, and her completion was delayed after this disorganization had come to an end. She was eventually launched on October 27, 1898, but even after she was afloat she was so neglected that it was not until November, 1900, that she was ready to leave Pembroke and proceed to Portsmouth for her trials. After some further procrastination she was taken to sea for her tests. Her second run in the Channel proved disastrous, and had to be abandoned, and she returned to port to have one of her crankshafts replaced. Since this time she has been continuously in the hands of the dockyard workmen. Recently she was taken to Spithead to resume her thirty hours' steam trial, but leaky condensers necessitated her return to Portsmouth for further overhauling. When this was completed she was taken out again, but once more broke down owing to leaky tubes. She is of the improved "Powerful" type, with a displacement of 11,000 tons, and is calculated to steam at 20¾ knots. All the British cruisers now being constructed are to steam at 23 knots, and are more heavily armed, besides having vertical armor in addition to one or more heavily protected decks. The "Spartiate" has no side armor. She will probably not be ready for commissioning until next spring, six years since she was authorized by Parliament, and nearly five years since her construction was begun.

Melting Snow by Steam.

The recent heavy snowstorms, which for several days have partially blocked the enormous traffic of New York city, brought to light three curious machines employed by the Street Cleaning Department for the removal of snow. In general appearance these snow melters resemble a road roller without rollers. In place of the forward rollers is a large iron box, into which a dozen men shovel snow. Behind the box and extending to the rear end of the machine is a boiler, from which two funnel-shaped pipes about a foot in diameter extend into the box. Steam is forced from these pipes through jets into the box, and the snow melts as fast as it is dumped into the box. The water runs down into a sewer. In eleven hours one machine removed 750 yards of snow. Nine teams were able to do the work for which seventy-five were formerly required.