

THE CHARLTON STREET SWEEPER.

The Charlton improved street sweeping machine, shown in the illustration, is of strong and simple construction, and has been proved to be of high efficiency, considering both the thoroughness with which it does its work and the quantity of work it is capable of. It weighs about 2,500 pounds, and is a light draught for two horses. The diagonally hung broom is operated in the usual manner, but the dirt, instead of being left in a windrow on the street, is swept into the open side of the drum represented in the figures. To facilitate this a flaring rubber flange is attached to the edge of the drum, which flange flattens where it touches the pavement, and thus forms an inclined plane, up which the dirt is swept into the drum. This is done with the utmost neatness, though the surface of the pavement may be quite uneven.

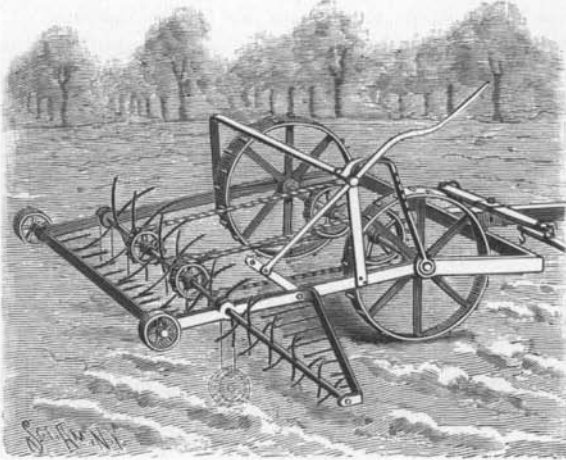
Buckets extend across the inner concave face of the drum, and serve to lift the sweepings up to the discharge chute. The latter is kept in position by a spring, which yields in case a large stone or other substance is taken up by the sweeper. So practical is this arrangement of the parts that Belgian block paving stones have been picked up by the machine without injury to it, and, on the other hand, in sweeping a wet asphalt pavement, the cart body of the machine has been half filled with water taken up. The outer edge of the rubber flange was at first protected by thin steel clips, to save it from wear; but this has been found unnecessary, as the flange has good endurance for the service, and it can be replaced at but small expense. The discharge chute empties into a box body, similar to that of an ordinary dumping cart, and which is readily dumped and again brought to upright position by the movement of a lever at the right of the driver. The free end of the broom works up to the curbstone, thus effectually cleaning the gutters.

With the street sweepers at present in general use, as is well understood, the dirt is swept to one side of the street, where it is left in a long, thin line to be swept into little hills by gangs of men following, it requiring a great many of these small accumulations to fill one of the carts which subsequently come along to

of the Shadbolt Manufacturing Company, Brooklyn, N. Y., under the direction of G. W. Brady. In its improved form it was in active operation in Newark, N. J., for several weeks under the auspices of the Public Works Department of that city. It was there used to clean the entire street and swept from 2½ to 3 miles of streets in a day of eight hours, seven strokes cleaning the entire street from curb to curb.

A CULTIVATOR FOR USE IN ORCHARDS.

A cultivator which is more especially designed for working the ground around trees, particularly orange,



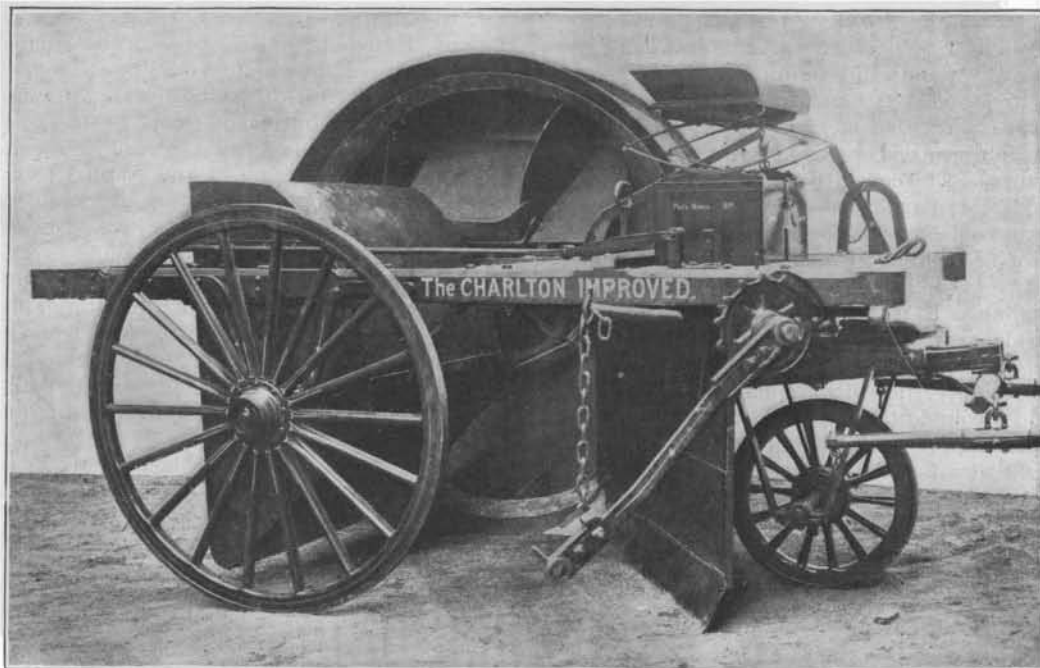
SMITH'S CULTIVATOR.

lemon, and olive trees, cultivating the ground close to the trunks of the trees without interfering with their roots, is shown in the accompanying illustration, and has been patented by Louis H. Smith, of El Cajon, San Diego County, Cal. The pole or tongue of the cultivator is attached to a U-shaped frame which extends forward from the main axle, and in side bars extending rearward from the axle is held the cultivator shaft, carrying curved teeth. A rearwardly extending cleaner frame is pivotally connected with the rear ends of the side bars, and this frame has small wheels adapted to

be brought in contact with the ground, raising the teeth of the cultivator, when the latter is taken to or moved from the field, or raised therefrom, as shown in the illustration, when the cultivator is in working position. Coupled at one side to the main cultivator shaft is an extension shaft, also carrying cultivator teeth, the teeth being shorter near the outer end of the shaft, and this exterior shaft is supported by a yoke frame extending out laterally from the main frame. The main cultivator shaft and its extension are rotated by sprocket wheels and chains from the main axle, the cultivator teeth passing between the teeth of the cleaner frame at each revolution. The rear wheels are raised or lowered, taking the cultivator teeth into or out of working position, by a lever in easy reach of the driver, this lever being connected by a link with a forwardly extending side member of the cleaner frame, whereby the latter may be carried to a substantially vertical position. With this cultivator the ground beneath the lower limbs and up to the trunks of the trees may be conveniently cultivated.

Distribution of White Corpuscles in the Vessels.

It has been held by some observers—Rieder and Schultz among others—that the leucocytes are very unequally distributed through the vascular system. The subject has been worked over again lately by Sémakine, who points out various reasons for considering these experiments to be unsatisfactory, especially because they took the blood for the purposes of examination from the dead animal, when it is not inconceivable that the blood in the central parts might contain more leucocytes than those in the peripheral regions of the vascular system. Sémakine's experiments were made on dogs and on rabbits in which leucocytosis and hypo-leucocytosis were artificially induced—the former by the injection of two or three cubic centimeters of a mixture of one part of turpentine to five of olive oil into the veins, the latter by the injection of five cubic centimeters of a solution containing one part of peptone in ten of water. In some of the rabbits leucocytosis was also induced by the subcutaneous injection of one part of papayotin in two hundred of water. Enumerations of the white corpuscles were also made in rabbits killed by a blow on the back of the neck, and in dogs killed with chloroform. The conclusions at which Sémakine arrived were that, so far as regards macroscopical vessels, the leucocytes are equally distributed, so that from an examination of the blood in the peripheric blood vessels the number of the white corpuscles in the central vessels may be determined. The same general statement holds good both for leucocytosis and for hypo-leucocytosis, the number of white corpuscles being increased in leucocytosis and diminished in hypo-leucocytosis equally in both central and peripheric vessels. In rabbits the mere fixation on the table as well as a blow on the back of the neck induces some kind of vaso-motor excitement, which causes an alteration in the number of the leucocytes to occur with extraordinary rapidity. These animals, therefore, are not well adapted for enumerative experiments of this nature. The unequal distribution of the leucocytes observed in rabbits when living is dependent upon the opening of the abdominal cavity, and the differences observed by Schultz were probably due to post-mortem changes.—Lancet.

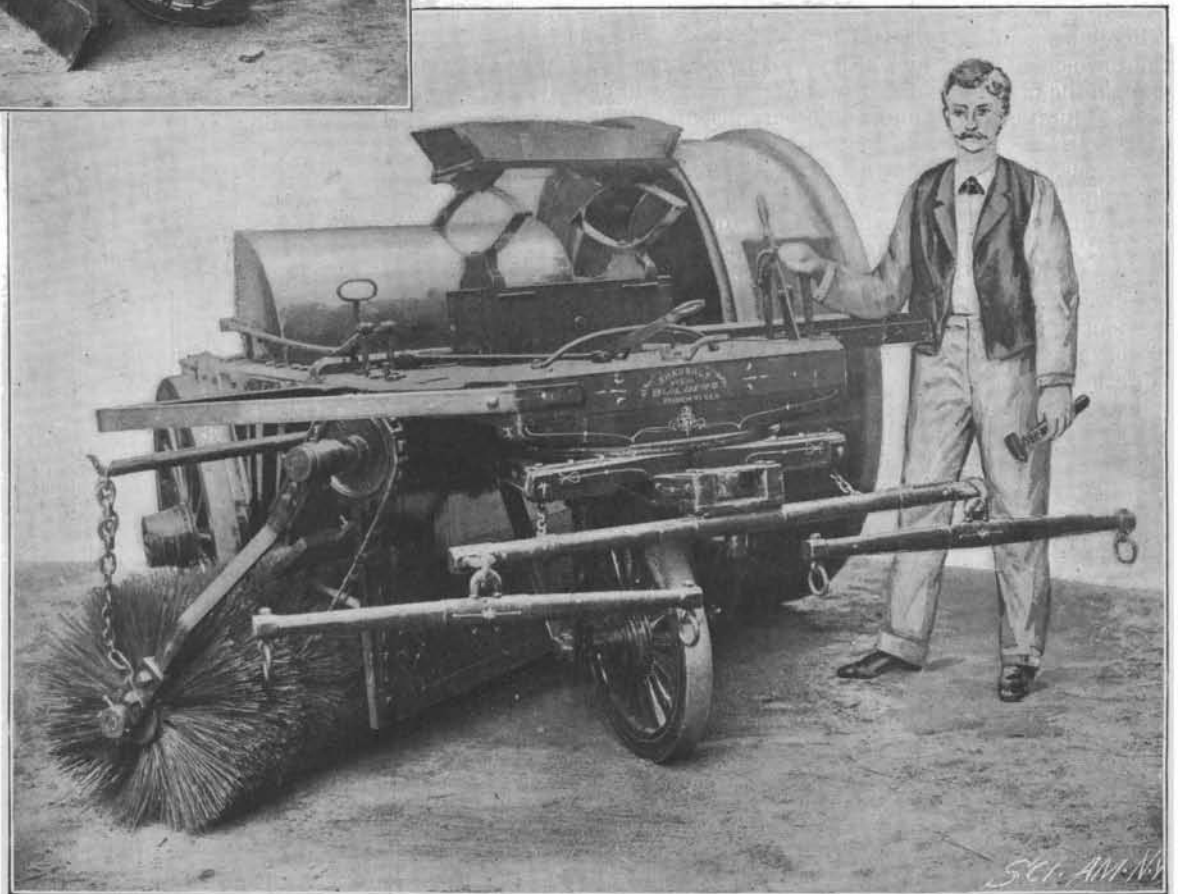


STREET SWEEPER—SIDE VIEW, BROOM REMOVED.

gather up what has not already been scattered again by the wind or by the wheels of passing vehicles.

Through the courtesy of the street cleaning department, the Charlton street cleaner last year underwent a thorough test in New York City on Fifth Avenue and Upper Broadway, sweeping some seven hundred miles of streets in conjunction with the department sweepers. The method employed was to pick up the dirt, which had previously been swept into or adjacent to the gutters, on each side of the avenue, by ordinary sweepers moving en echelon. During a part of the time the operation of the machine was observed by competent engineers who were engaged to witness and calculate the amount of work done. A portion of their report shows that during their observations, amounting in all to fifty seven hours, a distance of 128 miles was swept by the method above described; 129'34 cubic yards of dirt were picked up and deposited at convenient corners, in piles of 0'61 cubic yard each, at an average distance of 866 yards between each two piles. Since this test the sweeper has been greatly improved by carrying the sweepings directly into the drum instead of upon a belt as formerly, materially reducing the weight of the sweeper and increasing the efficiency, making the light and compact machine shown in the illustrations.

The machine shown in our illustration is being introduced by Marshall McLean, of No. 59 William Street, New York, the machines being built at the factory



THE CHARLTON STREET SWEEPER—FRONT VIEW.

Science Notes.

The Prince of Wales, President of the Society of Arts, recently presented to Prof. D. E. Hughes, F.R.S., at Marlborough House, the Albert Medal, awarded him by the Council of the Society "in recognition of the services he had rendered to arts, manufactures, and commerce, by his numerous inventions in electricity and magnetism, especially the printing telegraph and microphone."

A bill has been introduced into the Legislature of the State of New York which authorizes the city of New York to spend \$2,500,000 in the erection of a library building on the site of the old reservoir in Bryant Park, or rather adjoining it. The income of the Astor, Lenox and Tilden foundation is about \$160,000 annually; so that, if the building were provided, this would be sufficient to maintain a great reference and circulating library in the city of New York.

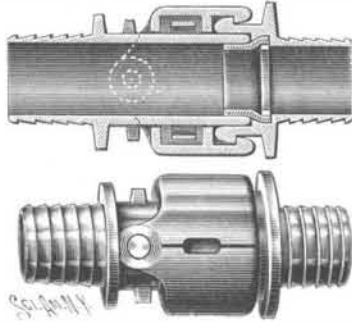
Vertical earth-air electric currents were first revealed by Dr. Adolf Schmidt, of Gotha, says Nature. In his mathematical analysis of the earth's magnetic field—the most carefully executed analysis up to date—he reached the following conclusion: The earth's total magnetic force consists of three parts, viz.: (1) The greatest part; this is to be referred to causes within the earth's crust, and possesses a potential. (2) The smallest part, about one-fortieth of the entire force; this is due to causes outside of the earth's crust, and likewise possesses a potential. (3) A somewhat larger part than the preceding; this does not possess a potential, and, in consequence, points to the existence of vertical electric currents. These currents amount, on the average, for the earth's entire surface to one-sixth of an ampere per square kilometer. The existence of such currents is indicated by the non vanishing of the line integral of the earth's horizontal magnetic force resolved along a closed curve of the earth's surface. Gauss carried out this test in a special case, and finding the integral practically zero, he assumed that the entire force is due to a potential. More recently, Prof. Rücker applied the same test. He found "no evidence in favor of the existence of vertical currents" over a region of the earth—the British Isles—which had been very minutely surveyed. The results of some preliminary investigations being confirmatory of Schmidt's conclusion, Dr. L. A. Bauer determined to carry out the test in a thoroughly systematic manner, viz., to take as the closed curves parallels of latitude, on which he read a paper recently before the Philosophical Society of Washington. The results obtained confirm those of Dr. Schmidt's more elaborate investigation. Summing up, Dr. Bauer finds that: "There are vertical electric currents which pass from the air into the earth, and back again into the air. Between 60 deg. N. and 60 deg. S. the average current intensity per square kilometer is about one-tenth of an ampere."

Sound Waves as Revealed by the Phonograph.

In a recent lecture on the above subject, says the Practical Engineer, delivered by Professor McKendrick at the third ordinary meeting of the Philosophical Society of Glasgow, the author, after describing the general nature of sound waves both simple and compound, gave a short description of the phono-autograph, an instrument which might be regarded as the precursor of the phonograph. By means of this instrument the vibrations of membranes could be recorded on a moving surface. He then described the general mechanism of the phonograph, and showed the various methods by which he had attempted to explain the peculiar marks made on the wax cylinder by the vibrations of sound. Photographs of outlines of the surface showed in a general way the number of vibrations, but they did not give the form of the vibrations. This led to the invention of a special apparatus—which was exhibited in operation—by which Professor McKendrick took advantage of the siphon recorder of Lord Kelvin, as used for ocean telegraphy. This instrument was adapted by special modifications to the phonograph, and the latter was caused to move with extreme slowness. In this way each vibration was recorded upon a long slip of paper rolled out by the machine, and the number and form of the vibrations as produced by musical sounds and by words were recorded. The lecturer then proceeded to analyze a word, and showed that it consisted of a succession of musical tones varying in pitch and in quality according to the voice of the speaker. The number of vibrations in many words was much greater than might have been anticipated. He took as an example the word "Constantinople," which, spoken by a rapid speaker, had as many as 700 or 800 vibrations. This could not be regarded as a system of shorthand, but it showed how nature constructed the sounds of words. Professor McKendrick also illustrated by experiment how the tones of the phonograph may be intensified, and how they may be caused to appeal to deaf people by stimulating the skin of the hands. It could not be said that the deaf heard by this method. That was impossible. But they could catch much of the time and rhythm of music. Possibly the method could be developed into a means of communicating with the brain of the deaf and dumb by the nerves of the skin.

A SIMPLE AND EFFICIENT FIRE HOSE COUPLING.

The coupling shown in the illustration is designed to facilitate the quick connection of two sections of hose and prevent leakage at the joint. It has been patented by John Kerns, of No. 601 West Fifty-second Street, New York City. On opposite sides of a short metal tube forming the end of one section are short pins on which are pivoted clamp jaws or hook members of general semicircular form, encircling the outer end of the tube, there being between the main bodies of the jaws and the tube a spring, and the jaws having an interior flange forming a stop for the hooks of the mating section. The springs act normally to draw the outer hooks toward each other, and an elongated aperture is formed partly in each jaw for the insertion of a tool to pry the jaws apart. The other coupling section has a ring or neck on which is an annular hook adapted



KERNS' HOSE COUPLING.

to be engaged by the hooks of the jaws when the two parts of the coupling are pushed together, the meeting faces being rounded to insure automatic opening of the jaws and engagement of the opposing hooks. Within the second section of the coupling there is also held a packing nipple or ring, the other end of which enters the opposite section when the parts are coupled, thus making a tight joint, which the pressure of the water only makes the tighter. At the outer end of each section is an externally ridged neck to receive the hose, and collars serve as stops and guards for the ends of the hose.

Orders from Switzerland.

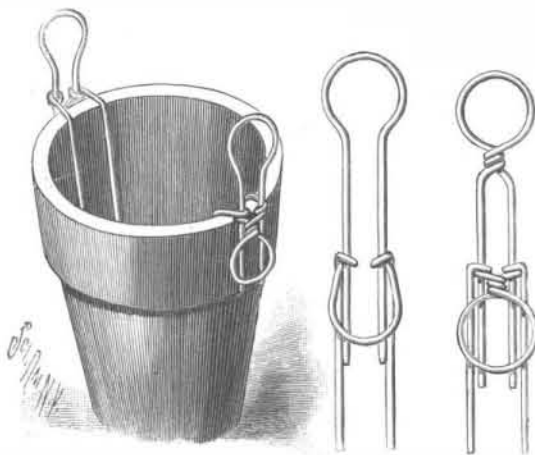
There is an inviting field for American fire apparatus in Switzerland, according to recent advices from the United States consul at Zurich. A fireman's smoke protector of American manufacture has been ordered by H. Schiess, chief of the fire department at Zurich, and if it stands the test of practicability, all of the fire departments in Switzerland will be equipped with it.

Chief Schiess has also asked Consul Germain to put him in communication with American manufacturers of firemen's portable electric lamps and other firemen's electrical appliances. The consul has transmitted the request to the State Department at Washington, with the suggestion that official notice be given to American manufacturers of firemen's life protecting inventions. The consul promises to report the results of such tests of American appliances as may be made in Zurich.

"All the fire departments of Switzerland belong to the Union of Swiss Fire Departments," writes Col. Germain, "and whatever new fire appliances one department should conclude to supply themselves with will be followed, if proved satisfactory, with orders from the other Swiss fire departments. I may add that no steam or chemical engines are in use in Switzerland, and that the old hand engines are still being used. With proper efforts, perhaps this also opens a new ground to prospect."

SIMPLE HANDLE FOR FLOWER POTS, DISHES, ETC.

To facilitate the handling of flower pots in greenhouses and other places, and also to serve as a handle



KRICK'S HANDLE FOR FLOWER POTS ETC.

for plates, saucers, etc., the simple and inexpensive device shown in the illustration has been invented and patented by William C. Krick, of No. 1287 Broadway, Brooklyn, N. Y. The device is made of wire, and consists of two parts, one of which forms a staple adapted to be inserted inside the pot, while it is bent over the upper edge of the pot and formed with eyes to receive the shanks of a lifting staple or handle, the wire of the latter being bent in various forms, of which two modifications are shown in the small figures.

Education in Russia.

Through the rapid growth of Russian power in Europe and in the far East we have presented a great collision of moral forces embodied in the civilizations respectively of the empire of the Czar and of Great Britain, says the Independent. This spectacle imparts a special interest to everything by which the tendencies of Russian influence may be gaged. Is it a power making for darkness or for light? The educational test is not an unfair one, and certainly in the two departments of technical and of diplomatic training Russia may give lessons to the world. But what does her supremacy promise for popular enlightenment? The answer is suggested by her illiterate population, seventy per cent of the total. More impressive yet is the dark cloud that settles down upon provinces that have been or are in the process of being Russianized.

A few decades since the Baltic provinces had excellent schools, and in Courland especially instruction was general. Now many of the peasants, the children and grandchildren of literate parents, are unable to read and write, because they are forced to learn the Russian language, which they do not comprehend. In the interior of Russia it is estimated that there are 5,000 villages without a schoolhouse, in hundreds there are houses but no teachers. Besides, the snows and storms in winter are so severe that pupils often cannot reach the school, if one exists, for several days. Even in the spring, when the snows are melting, the roads are frequently impassable. These causes, with the innumerable holidays (i. e., church and fete days), reduce schooling to a ridiculously short period. In St. Petersburg itself, where the conditions are vastly better, it is admitted that the schools are generally overcrowded and inconveniently placed, and that from six thousand to ten thousand children of school age are kept from instruction by the want of accommodation. The mayor of the city has recently urged the necessity of a compulsory school law, while admitting, however, that there is no prospect of securing such a measure.

The Development of Russian Industry.

The British consul at Moscow, in a report on the Nijni Novgorod exhibition, describes the industrial progress of Russia since the Moscow exhibition of 1882 as very great. The progress made in textiles is marvelous, and many of the silk and print exhibits equaled anything that Lyons or Manchester could produce. The machinery section was full of good work, but agricultural machinery left much to be desired. In the mines section there were some wonderful pieces of iron work which would attract attention in any country; but although the constant remark was that every object was purely Russian, British and German foremen are largely employed in the iron works, Frenchmen in the silk and many of the print works; while British subjects have still very much to do with the cotton mills. The development of the natural wealth of the country is even greater than that of the manufactures. The production of coal has trebled in the last fifteen years.

Cotton planting prospers in Tashkent and Erivan, and the results in the new plantations of the Southern Caucasus are excellent. Costly experiments near Baku have produced a Russian tea, which is shown with much pride, and General Annenkoff is planting American vines in Turkestan; tobacco is also being grown from American seed near Samarkand. Generally speaking, every branch of industry has improved, except agriculture, which grows worse year by year. Mr. Medhurst thinks that Great Britain should still be able to supply Russia with portable engines, high pressure steam boilers, steam thrashing machinery, heavy iron plows, bicycles, and machine tools.

Calico and kindred stuffs appear to be made sufficiently well at prices which are so low that they must affect British trade; but he thinks some years must elapse before Russia can construct satisfactory spinning machinery in sufficient quantities to affect British makers. He saw nothing in the hardware section to alarm our manufacturers of high class goods, and, generally, he came to the conclusion that the trade in cheap goods is slipping away from us, but where high class articles of the best materials are required, it is admitted that the British stand first, except in Manchester goods. The consul says that when England first permitted the export of spinning and weaving machinery, in 1843, there were 350,000 spindles in all Russia, which produced yearly 5,600 tons of yarns.

In 1895 there were 5,000,000 spindles and 200,000 looms at work, producing 161,300 tons of yarns and giving employment to 400,000 hands. British and German foremen are being gradually replaced by Russians, and attempts have been made—with very indifferent results so far—to supplant British machinery by that made in Russia. Efforts to provide her own raw material have been more fortunate. In 1883 the total value of cotton goods produced in Russia was £27,790,000 and in 1892 it amounted to £38,470,000. The Russian silk trade has prospered since 1875. The woolen industry is not so prosperous. The best Russian cloth is made by an English firm, settled near St. Petersburg since 1841, which employs 2,160 hands.