

nish, which renders it absolutely impermeable, and augments the resistance of the envelope, rendering it capable of supporting, without rupture, a pressure of 6,400 pounds to the square yard.

The balloon, which is spherical in shape, will contain an immense internal balloon so constructed as to be perfectly and permanently inflated by 3,250 cubic yards of gas under the same pressure. This is intended to remedy, in great part, the grave inconveniences—the chief cause of balloon instability—which result from hygrometric and thermometric variations produced by altitude changes. The interior balloon is furnished with two valves of automatic certainty which will be in communication with a ventilator moved by electric action. If the gas becomes thinner, the interior balloon can be depleted. If it becomes thicker, the interior balloon can be inflated. The "Sivel" is thus always inflated. The internal balloon represents about one-fifth of the entire balloon, a needed proportion, since balloons raised 2,700 feet lose about one-tenth of their gas, independently of the loss occasioned by temperature variation. The "Sivel" will carry several pilot balloons to be used in studying aerial currents, and sixteen balloonets to supply, through its valves, the gas of the interior balloon of the "Sivel." The balloon's altitude will be regulated by means of a trail rope of considerable weight, which trails as a species of anchor over the ice.

Fig. 1 represents the "Sivel" with its circlet of supply balloonets and its mobile anchor trailing over the ice.

The car, which is of osiers, is so strengthened by steel armatures as to be absolutely rigid. It is so arranged as to maintain in its interior a regular temperature. A safety petroleum heater is used for the purpose. The car will be prepared for all emergencies by making it unsubmersible and furnishing it with runners for use as a sledge. It is ten feet wide by sixteen long, and will contain, besides the two explorers and their three aids, eight Esquimaux dogs, a sledge, an unsubmersible canoe, provisions and water rendered unfreezable by a chemical procedure. The total weight of car and contents is fifteen tons. Above the car is a bridge accessible by a rope ladder.

Fig. 2 represents a section of the car with its contents.

The explorers will sail from France in two steamships in the latter part of May, 1892, so as to arrive in Spitzbergen in July. There they will depart as soon as practicable by favorable winds from the south. The exploration will last in all six months. Its cost will be \$108,000, of which \$12,000 is required for the construction of the "Sivel." The cost is defrayed by Mr. Hermitte and some English capitalists of scientific aspirations. While the idea of reaching the north pole by balloon is not a new one, it has had its details on this occasion for the first time worked out with great care. *L'Illustration.*

A Novel Logging Road.

Mr. Angus McPherson, of Cumberland County, Nova Scotia, has built 1½ miles of railway into his lumber woods this summer and is now running a train on it. He has already taken out about 100 cords of hemlock bark, and is now ready to begin to carry out logs. The rails he used are round spruce poles, properly six inches in diameter at the larger end, tapering down to half the size, and neatly joined at the ends. The sleepers are small round poles on which the rails are spiked. The rolling stock consists of a small upright engine, eight horse power, and two flat cars, manufactured by A. McPherson & Co., Oxford. The tires of the wheels on engine and cars are made with a flange on both sides to prevent them from leaving or speeding the rails, and the wheels have play enough on the axles to accommodate themselves to any inequality in the width of the rails caused by the difference in size of the poles used.

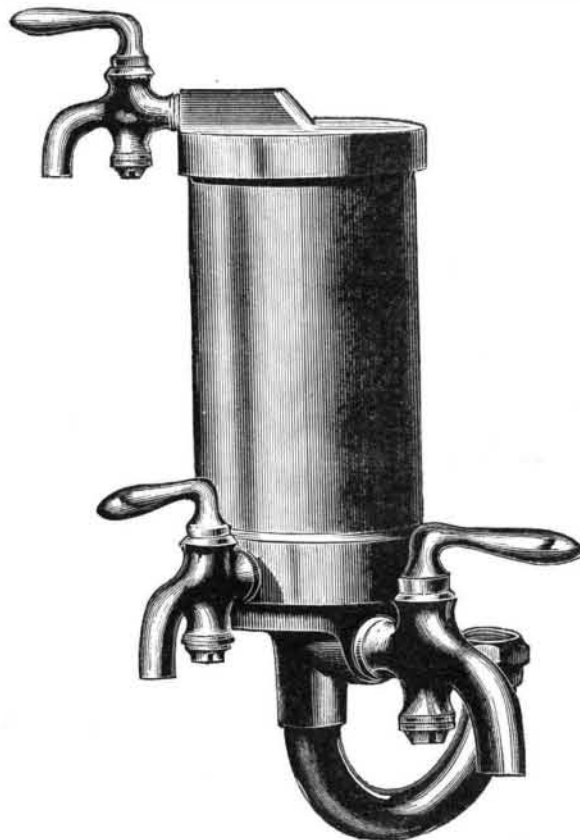
Mr. McPherson has gone to no unnecessary expense in grading his track. He has followed round the hills, and says he has comparatively level track. The engine is placed between the two cars he uses, so he has no trouble in making up his train. He expects this engine to do the work of eight horses, and he can carry on his work all winter even if there should be no more snow than there was during the last two or three seasons. It was the scarcity of snow in late winters that prompted Mr. McPherson to adopt this means of getting his logs out to the river. It cost about \$300 to lay his track, and the engine cost \$400. What has already been done shows clearly that the plan is feasible. —*The Timberman.*

IN our country, three-fourths of the nation's illiteracy is in the South. Forty per cent of the whole population of the South cannot read the New Testament. Of the 2,000,000 illiterate voters in our country, 1,500,000 are in the South. The negro population, now about 8,000,000, increases at the rate of 500 per day.

Among the more than 2,000,000 mountain whites in the South, one-half cannot read. Of the 50,000 Indian children, less than 15,000 are in school. The Chinese in America are few, but they represent one-third of the population of the globe.

THE "CRYSTAL" WATER FILTER.

The accompanying cut represents the "Crystal" water filter now being made and sold by the Crystal Filter Co., of Buffalo, N. Y., and which was patented in 1887 by Mr. William Franklin, of New Haven, Conn. It is a pressure filter and can be made of any size. The cut represents Crystal No. 2, especially designed for household, office, and general use. It has an outer case 8 inches long and 3½ inches in diameter, and inner cylinder of seamless brass tubing. The whole is heavily nicked, and when put up presents an attractive appearance. The filter is attached directly to the supply pipe by the ordinary connections, and a lower large faucet is connected with the supply pipe, so that unfiltered water can be drawn directly, requiring no extrapipes. From another faucet one grade of filtered water can be drawn, and the finest grade is obtained from the faucet at the top. The filtering material is contained in an inner cylinder which can be removed at pleasure by unscrewing the top of the filter. This filtering material is held in place by means of screw clamps, thus permitting it to be packed tightly or loosely, or with any filtering medium desired. That used by this company is a combination of corundum invented by Mr. Franklin. Another special feature is the reversibility of this filter cylinder, whereby on supplying the full pressure all foreign matter is effectually expelled. Perhaps its greatest merit lies in being automatically self-cleansing while working. The lower large faucet is then kept open, and by means of fine disks just below the filtering cylinder all the grosser



THE "CRYSTAL" FILTER.

impurities, which would otherwise be pushed in and remain to defile the filter, are immediately separated and washed off through this faucet. Its convenience, durability and simplicity are designed to win for it a high degree of public favor. Dr. Fell, president of the American Society of Microscopists, has reported that water passed through this filter was as pure as could be obtained by any mechanical means.

A Line-throwing Gun.

The necessity of having a reliable method of effecting communication between the shore and a ship in distress or between one vessel and another has always been recognized, and to this end various line-throwing appliances have been brought forward from time to time. The latest of these is the shoulder line-throwing gun invented by Captain J. D'Arcy-Irvine, R.N. This apparatus, which is not an expensive affair, consists of a shoulder gun having the cop, or coil of line, suspended in a case carried under the breech of the gun. A rod is inserted in the barrel, the fore end of the rod being connected with the end of the line, which is in the center of the cop. The line is 144 yards long, and the charge of powder used is 2 drachms. Upon the gun being fired at a high elevation, the rod is projected upward and forward, carrying the line trailing away after it. The object is, of course, to land the line over the ship or other object, the rod dropping beyond it. By this means a rope can be made fast to the tail end of the line by the succoring party and be hauled on board by those in distress. A demonstration with this system recently took place near London. There were present Admiral Sir John Corbett, of the National Lifeboat Institution; Captain Chetwynd, chief inspector of lifeboats; Colonel Clayton, and others. Several shots were fired by Captain D'Arcy-Irvine, which successfully demonstrated the value of his system so far

as it could be demonstrated on land and apart from the conditions under which such apparatus is required to be used. Good ranges were obtained, and the line was carried well over the intended object. Captain D'Arcy-Irvine drew attention to the desirability of the invention in the case of taking vessels in tow in a high sea, or in the case of arresting vessels drifting ashore by firing from vessels at anchor. He likewise lays great stress upon the use of the apparatus in the lifeboat service, urging that every lifeboat should carry a line-throwing gun, which would enable communication to be effected with a vessel when it might be impossible for the boat to get alongside her. The whole apparatus only weighs 9 lb., and could well be stowed away on board a lifeboat.

High Speed War Ships.

A considerable advance in speed has been made in the new ship, since the natural draught speed of the Piemonte was 20.4 knots against 21.237 knots obtained by the 25 de Mayo.

In the following table are given particulars of some of the fastest war vessels at present built for our own and foreign navies:

HIGH SPEED SHIPS THAT HAVE BEEN TESTED ON THE MEASURED MILE.

Ship.	Displacement.	Length.	Speed.		I. H. P.	
			Forced draught.	Natural draught.	Forced draught.	Natural draught.
Spanish... Reina Regenta	4,800	317	20.6	18.68	11,500	3,508
French... Sarcot	1,850	312	20.51	17.3	6,287	
"... Forbin	1,850	312	20.64			
English... Medusa	2,800	265	19.9	18.005	10,000	6,300
French... Cecille	5,670	380	19.436		10,680	
United States... Baltimore	4,400	315	19.5		10,750	
Italian... Piemonte	2,500	300	22.3	20.4	12,700	7,000
Argentine... 25 de Mayo	3,200	325	22.43	21.237	13,800	8,700

Besides these there are a number of passenger vessels which have realized exceptionally high speed. These include the Teutonic, Majestic, City of New York, and City of Paris, which have attained maximum ocean going speeds of about 21 knots.

It will be also interesting in this connection to note some of the high speed cruisers at present in course of construction. These are given in the following table:

HIGH SPEED SHIPS NOW BEING BUILT.

Ship.	Displacement.	Length.	Speed.		I. H. P.	
			Forced draught.	Natural draught.	Forced draught.	Natural draught.
British... Blake and Blenheim	9,000	375	22.0	20.0	20,000	
"... Vulcan	6,620	350	20.0		12,000	
"... Edgar class	7,350	360	20.0		12,000	
Spanish... Almirante Quendo	7,000	365	20.0		15,000	
"... Alfonso XIII. and Lepanto	5,000	318½	20.0		11,000	
French... Alger, Isly, and Jean-Bart	4,160	346	19.0		8,000	
"... Dupuy de Lome	6,297	376	20.0		14,000	
"... Charner	4,745	348	20.0		8,300	
"... Davoust	3,027	297½	20.0		9,000	
Italian... Liguria class	2,280	262½	20.0		6,500	

—*Engineering.*

Globular Lightning.

Among the disputed points in the subject of electrical discharges is the phenomenon of globular lightning. Many treat this as an optical illusion due to the excessively minute duration of the spark discharge, just as, when we have for an instant gazed upon the noonday sun and turned away, we see a reddish globe of fire float slowly straight before our eyes. So singularly do the descriptions of globular lightning tally with this well-known phenomenon, that this explanation would be irresistible were it not for the fact that these portentous spheres are alleged to terminate their alarming promenades by a deafening explosion. On the other hand, it is impossible to explain away the many records of persons who have seen the slowly moving globes of fire. Among these persons was the electrician Cavallo, who saw a luminous ball slowly ascend the stem of a Leyden jar, then slowly descend and burst with a loud report. At a recent meeting of the Academie des Sciences, at the conclusion of a paper on this topic by M. Faye, the meteorologist, the ex-Emperor of Brazil narrated how, nearly forty years ago, when traveling on horseback in the southern province of Rio Grande, he saw a globe of lightning fall, traverse the fields for some instants, and then burst with a loud sound. Will none of the votaries of the camera at least attempt to fix a globular discharge while it is perambulating across the landscape?—*The Electrician.*

A COMPANY has been formed at Chicago, with a capital of ten million dollars, for the manufacture and use of aluminum. It is called the International Aluminum Company.