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Contents :

(Illustrated articles are marked with an asterisk.)

THE VOYAGE OF THE GRAPHIC BALLOON.

As the 10th of September, the day setapart for the ascent of the *Graphic* balloon, is also the regular day of publication for the present issue of our journal, we are obliged to go to press without waiting to learn the circumstances of the departure. In case the latter take place, however, the facts will be found in our following number. We have obtained, through the courtesy of Mr. Donaldson, a number of original sketches by that gentleman of novel and interesting apparatus and modes of performing operations pertaining to the voyage. These ingenious conceptions, we illustrate on our initial page, and give herewith various explanations and particulars concerniug them.

The representation of the air ship itself, which forms the center piece, is intended to give an idea of the proportionate sizes of the balloon, car, and life boat. The great sack is 108 yards in circumference, and is constructed in nine elliptical sections, each 176 feet long by 54 feet wide. These are joined together by means of two rows of stitching to each seam, in the style known to seamstresses as "felling"; and then each seam is covered with two coats of varnish composed of linseed oil, beeswax and benzine. The sewing together of the fabric is at the time of writing completed, and nothing remains to be done but to add the "re-inforce" or crown piece, consisting of one additional thickness of sheeting extending twenty feet in every direction from the zenith of the globe; and to complete the riveting-in of the safety valve at the extreme top. The marline netting which is to envelope the balloon, will then be put in place and inflation proceeded with. The car is fourteen feet high. and is divided into two compartments, the upper of ten and the lower of four feet. The second floor, on which the aeronauts will live, is nine feet in diameter. The small cabin thus formed is furnished with tables, chairs, instruments, etc., and the space below is devoted to ballast and stores. The exterior of the car, which is now completed, is covered with blue and white striped canvas, and quite prettily decorated with flags. The peculiarity of this part of the apparatus is that it may be readily cut away, piecemeal, when it becomes necessary, through the escape of gas diminishing its sustaining power, to lighten the balloon. After the ballast is all gone, the lower part, and then the upper portion, of the car is dropped, leaving the lifeboat still suspended from the concentrating ring, as a means of support to the voyager. The boat is twenty-two feet long by four feet broad, built of Spanish cedar, copper fastened and clinker built. She is fitted with the necessary spars and sails, and is considered fully able to keep afloat, even in the roughest weather.

The arrangements for suspending boat and car are shown in our engravings. In order to avoid any danger through the breaking of the concentrating ring, and at the same time to have the netting firmly secured thereto, the device shown in the lower left hand corner of the engraving is employed. This consists in fastening the heavy ropes (sixteen in all), which carry the weight of the car and its contents, around the ring by a clove hitch, and splicing a thimble in the upper ends to which the netting is attached. If, as was the case with the unfortunate La Mountain, the ring should break, the ropes would merely swing out and still support the load; while on the other hand, they can be cut below the ring without the clove hitch slipping from the latter.

In case gas should escape from the main balloon to such an extent that the aeronauts find themselves rapidly descending, the ballast goes first, then all movables, then the car, piece by piece, then the small balloon, until nothing is left but the life boat and also the canoe hanging from the concentrating ring. Four ropes lead from the boat up outside of the carto the ring, so that it hangs from the latter, independent of any other portion. The party is now in the boat, but the balloon is still descending. As they near the water, a drag composed of a number of canvas buckets attached at intervals along a rope is thrown out, forming a sort of sea anchor and steadying the balloon. As soon as the life boat touches the surface, the sustaining ropes are cast adrift, leaving her attached to the balloon by a single line which is fastened to the bight of another rope, the ends of which pass through rings near the bow and stern of the vessel, joining amidships. At the same time, a canvas drag is veered astern, keeping the bow of the boat in the direction the balloon is travelling. This arrangement will be understood from the drawing marked "detaching the canoe," an operation afterwards performed in a similar manner. Knots in the rope prevent it being drawn through the rings in the boat in the wrong direction. At the word, one of the party cuts the line between the rings, out of both of which at once the ends are of course pulled by the balloon. The boat is then free, and sail is made. Meanwhile one of the party (Donaldson) has remained behind. We may here remark that four persons are all that will undertake the voyage; the two aeronauts, Wise and Donaldson, an officer lately of the merchant service, and a reporter of the *Daily Graphic*. While the operations of getting the large boat clear have been under way, Donaldson has been letting out his drag of buckets, securing his canoe to the concentrating ring and finally fastening to the latter two blocks, through which he reeves a rope, to one end of which he attaches a bag of sand to act as a counterbalance, and to the other—himself. It is clear that, as soon as the life boat is cut adrift, unless something hold the balloon, it will, on being so greatly relieved, shoot upwards too suddenly and dangerously. Here the canvas buckets come in play; but after the large boat is fairly clear, these must be hauled up to enable the balloon once more to ascend. How this is to be done, another of our drawings represents. Donaldson lets himself down by his cord, the sandbag balancing him, until he can get hold of the rope, then he pulls up the buckets and empties them one by one. It is hoped that, by thus so greatly lightening the balloon, it may with its single passenger be enabled to reach the European shore in safety; but in case even these endeavors prove fruitless, Donaldson will have to take to his canoe and trust to reaching land in her, or else to being picked up by some passing vessel.

The drawing of a man dangling like a spider from a line, on the right of our engraving, represents the mode of taking observations of the sun. The navigator is placed in a sling or chair, and hoisted by a whip from the balloon netting, well out on the sunny side, so that a sight can be got without the shadow of the globe. This apparently unsteady position will really, we think, be susceptible of less motion than on the deck of a rolling ship; the correction for "dip" to be applied to the observations, however, we imagine, will be something rather extraordinary.

The two upper sketches are a plan of an ingenious descent alarm and of an automatic ballast regulator, both ideas of Mr. Donaldson. The former consists of an ordinary barometer tube, A, ending below in a cup, B, filled, of course, with mercury. Passing up through the latter are two insulated wires, which, as shown, connect with a battery and burglar alarm bell. These wires extend up the tube until they reach a point, corresponding to the hight of mercury due to an elevation of 2,000 feet above sea level. Here they meet, and at the junction is a non-insulated point of metal. Of course just so long as the balloon remains at an altitude of over 2,000 feet, the surface of the mercury will be located below the point of junction of the wires, but the moment a descent occurs below that elevation, the mercury, rising, comes in contact with the non-insulated metal, establishes the current and sounds the alarm. The 2,000 feet mentioned is merely arbitrary, as the instrument will be regulated to give warning whenever the balloon sinks below the current of air in which it is desired to travel.

The ballast regulator is an ingenious contrivance for keeping the balloon balanced, so to speak, at just a certain hight. Mr. Donaldson informed us that the position of the air ship can be thus adjusted with the greatest nicety, and mentioned an instance where he managed to sail for a considerable distance at a hight of only six feet above the ground, hardly varying his altitude an inch until on carelessly throwing out a piece of bread, he was surprised to notice that he had ascended some feet. The apparatus referred to consists of a bladder, A, inflated before ascending, with common air, and placed between two boards, one of which is fixed upright and the other hinged thereto. A rubber spring keeps the movable piece up against the bladder, and, by suitable connection, the moving board is attached to the handle of the spigot of a water barrel, so as to turn a stream on or off in accordance with its motion. This connecting device is so adjusted that, when the bladder swells, as the balloon rises into atmosphere of greater tenuity, the handle of the spigot is moved to diminish gradually or check the escape of water. Should, however, the balloon descend slightly, the contraction of the bladder allows the rubber spring to pull open the faucet, and permit a sufficient discharge to enable the resumption of the proper level.

HELL GATE.

Owing to the reduced appropriation made this year for the improvement of the East River channel at Hell Gate, the work on Hallett's Point progresses slowly, very few miners being employed. The headings and galleries are nearly completed according to the original plan; still an immense volume of rock remains to be removed.

Our readers will remember that it was at first intended to remove part of the rock dry and the rest by grappling after the breaking up of the reef by a grand explosion. The experience since gained on Pot Rock has shown the cost of grappling in a current like that of Hell Gate to be much more than that of removing the rock from below, even under the unfavorable conditions that prevail at Hallett's Point. It has, therefore, been decided to sink the entire excavation under the river some twenty feet deeper, making a cavity capacious enough to engulf the shell of the reef and its supports, yet leave a depth of water above sufficient for the passage of the largest vessels. The deepening of the excavation has been begun in the Humphrey and Hoffman headings.

The skill and care with which the work has thus far been carried on give assurance of the successful completion of the undertaking at as early a date as the funds provided will admit of. Already 90,000 blasts have been fired, consuming 33,000 pounds of nitro-glycerin, without a single accident—a remarkable record for an explosive material having such an ominous reputation for going off inopportunely. An elaborate survey of the Gridiron has been made by soundings, during the year, but as no appropriation has been granted for its destruction, its lease of life is indefinitely extended.

Among the valuable scientific observations made during the progress of the work at Hallett's Point is an extensive and very interesting series on the transmission of power by compressed air. The drills are several hundred feet distant from the compressors, yet the variation of pressure between the receiver and the drills is surprisingly small, ranging about two or three pounds in a pressure of fifty. Not unfrequently the gage at the drill records a pressure one or two pounds greater than that simultaneously observed at the receiver, the excess being attributed to a pulsation caused by the periodic stroke of the drill.

THE VIENNA PRIZES.

The complete list of awards to American exhibitors at the Vienna Exposition has at length been received, and 359 prizes have, it appears, been won by our representatives, the total number of whom, according to the latest information, was 922. It seems, therefore, that but a little over a third of all present, including those not competing, received distinctions. Out of 412 grand diplomas of honor, the highest award, America has taken eight; four of these go to the group of Education, and are given respectively to the Smithsonian Institution, the National Bureau of Education, the State of Massachusetts, and the city of Boston. The remainder are won by S. S. White of Philadelphia for artificial teeth, W. A. Wood, Hoosac Falls, N. Y., for mowing and reaping machines, William Sellers & Co., Philadelphia, for puddling furnaces and tools, and Corliss for perfection of steam engines. The latter gentleman was not an exhibitor, although his improvements appeared on large numbers of both American and foreign engines, and consequently there is considerable dissatisfaction expressed by other persons who went to the expense of competing but failed to gain the diploma.

The medal for merit was awarded to 155 exhibitors. It seems that there was no comparison instituted between like articles in the departments of different nations, and that the premium simply means that a meritorious display has been made. One medal is as good as another, so that inventions of real value and excellence, exhibited by originators and manufacturers, gain no higher distinction than articles of much less importance contributed through dealers and commission merchants.

The medals for progress number 57. This distinction is given for valuable designs or inventions made since the Paris Exposition of 1867. It may be fairly considered as a higher prize than the medal of merit. It has been awarded for chromos, photographs, several agricultural machines, the sand blast, and to the Remington, Howe, Wilson, Singer, Wheeler & Wilson, Secor, and Weed sewing machines; besides other articles, of which, for lack of space, we are obliged to omit mention.

The medal for good taste was designed for artists who do not compete for the progress or merit medals. Four have been awarded to Americans, two of them being to artists (Bierstadt and Healy); and, strange to say, two to makers of artificial teeth, which is probably a mistake in the published list.

The coöperative medal, given to assistants for producing meritorious articles of work, has been conferred upon 19 persons. Three are awarded for labor on the Wilson Sewing machine, two for the Wheeler & Wilson, three for the Singer, three for the Howe, and one for the Weed.

Honorable mention (or the diploma of recognition, as it is termed) has been made of 116 individual exhibitors, and also of ten cities for school reports.

In the absence of the particulars regarding the number of awards gained by other countries, it is hardly possible to estimate the relative proportion of prizes taken by Americans. It appears, however, that the comparison cannot be much in our favor, for it is stated that over 30,000 medals and diplomas were granted, and that the mere list filled a quarto volume of 529 pages. The only award of any real value is the diploma of honor, for the medals indicate no particular excellence. Our sewing machines, known to be the best in the world, gained no higher distinction than the awkwardest imitations from English and German factories.

The description of the ceremony of presentation of medals characterizes it as an extremely stupid and tedious affair. The Emperor was not present, and the awards, which it was supposed would be conferred by him in person upon distinguished inventors and others, were read from a list in the hands of Baron Senborn.

A NEW railway tunnel through the rocks of Jersey City Hights, opposite New York, has been begun by the Delaware, Lackawanna & Western Railroad..