COMPRESSED AIR FOR LIFE BOATS.

To the Editor of the Scientific American:

In your paper of June 5, you print an article from the *Engineer*, on the means of forcing life boats out through the heavy surf and the rough water which are the necessary concomitants of the very circumstances which make their services of vital importance. The difficulties to be overcome are very forcibly and very correctly set forth, and the writer shows conclusively that the use of steam as a driving power for life boats is not within the range of possibility. The fire could not be maintained, nor could a boiler of any form, even if hung on gimbals, do its work. The violent shocks, to say nothing of the topsy-turvy commotions which the boat is constantly receiving, preclude absolutely the conjoint presence of steam and boiling water in the same reservoir.

If a life boat is to be forced out through the surf in any other way than by means of oars, it must clearly be by some power different from steam. And my present object is to show that such a power we have ready to our hand. It is now coming more and more into use, and for this special service is most admirably adapted; it is *compressed air*. Among several articles written for you by me in 1883, hoping to draw attention to the "Storage of Wind Power," was one, in your paper of Dec. 8, relating to its application to small motors. The facts, and the inferences from them, there stated bring us very appositely to the consideration of this matter of the life boats. The motor demanded must be: 1. Compact. 2. Unaffected by position or by shocks. 3. Always ready. 4. Able to supply the full power of a boat's crew and more, for often the strength of the crew is insufficient. 5. Sure in its action, and without risk of failure. 6. Involving as little weight as possible. Every one of these points is perfectly covered by the use of compressed air, as we shall see.

Nos. 1, 2, and 3 we need not consider, for they are manifest. Let us look to the requisite provision for No. 4. I propose to furnish the equivalent of twelve men, though no life boat carries such a crew on our coast. Such an amount of power, equal to two nominal horse power, will never be needed for any continued length of time. It is barely, in driving the boat out through the breakers, that it may be required, and for this a very few minutes must always suffice. After this, her crew are equal to her demand. And as the services of a life boat, in case of wreck, are limited to a brief period of time, we may safely calculate that the equivalent of one horse power for four hours is all that we need to provide and keep in store, and we can base our calculations on this amount.

Taking the ordinary tables, and assuming that the pressure on starting is 3,000 pounds, we find that reservoirs holding in the aggregate six square feet will give us all we need, with a surplus. After a service of four hours, we shall have in store a pressure of about 1,000 pounds. This is on the reckoning that we turn on as much as four horse power if required for sudden and brief strain. Thirty-one feet of six inch pipe will afford us the space indicated, and, if made of good steel, need not weigh over 300 pounds, say the weight of two men. But we have saved double that amount of load for the boat, for we have diminished the number of her crew. The services of the crew of a life boat are chiefly to manage the craft and take her to and from the wreck. Not more than two men commonly, and sometimes only one, can give their attention to the life saving work, all their skill and strength being otherwise demanded. And as we have the power for propulsion independently supplied, the boat need carry men only in proportion.

Another very important point is this: In shipping the terrible seas which so often come on board in the breakers, the men are caught by them at the greatest disadvantage possible. At the very moment when the crashing sea comes down on their heads and backs, each man's utmost strength must be given to his oar, and he is braced as solidly as the timbers of the boat, and receives the heavy blow without the slightest chance to shield himself. If, on the contrary, we are driving the boat as has been here proposed, the men can be shielded very greatly, and many bad injuries avoided.

As to the mode of applying the power secured in the use of compressed air, opinions may be various, as was clearly shown in the article mentioned, where some of the difficulties are well stated. But with the power supplied we certainly can find the means of using it. My own preference is decidedly for the method recommended by me in your paper of Jan. 5, 1884, that is, direct pneumatic propulsion. It needs perhaps a large amount of experimental work, but I fully believe that for such service as this of the life boat it affords the most efficient and most economical method available.

Of the method of compressing the air and holding it ready for instant service, I say nothing here. In the articles to which reference has been made, I expressed my ideas in brief on that point. A.

Iron Dissolved by Sugar.

MM. Klein and A. Berg have been studying the action of sugars on the corrosion of boilers, and find that sugar in water has an acid reaction on iron, which dissolves it, with a disengagement of hydrogen. The quantity of iron dissolved increases with the proportion of sugar in the water. The salt of iron formed is the acetate. A neutral decoction of malt also corrodes iron, with disengagement of hydrogen; but glycerine and mannite are without action on the metal. These results are worthy of note in sugar refineries and places where sugar sometimes finds its way into the boilers by means of the water supplied. The experimenters in question also find that zinc is strongly attacked by sugar; copper, tin, lead, and aluminum are not attacked.

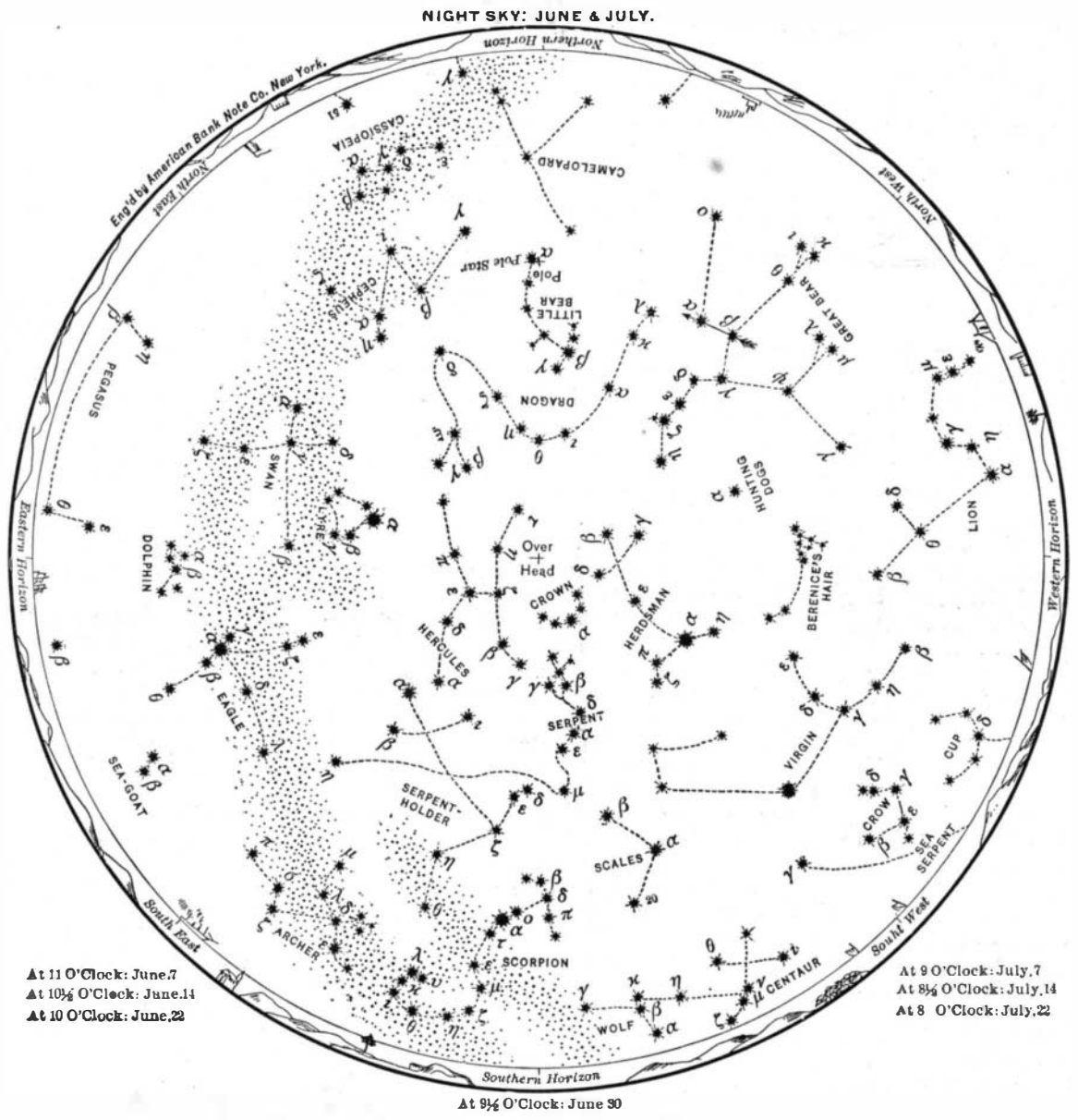
THERE are reasons for believing, says the *Northwestern Lumberman*, that in the making of stock sizes of sash, doors, and blinds, in the factories of the Northwest, white pine will not much longer be the only material used. Poplar is commonly thought of as the most available substitute, and so it probably will be as long as it remains at anything like its present price, but there are other woods which may receive favor. One prominent Wisconsin manufacturer is now making doors of basswood, treating them to a priming coat of paint and sending them out to his regular customers. They are said to give good satisfaction in every respect, and particularly in point of price.

NIGHT SKY—JUNE AND JULY.

BY RICHARD A. PROCTOR.

The Great Bear (*Ursa Major*) is in the mid-heavens toward the northwest, the Pointers not far from the horizontal position. They direct us to the Pole Star (α of the Little Bear, *Ursa Minor*). The line from this star to the Guardians of the Pole, β and γ, is in about the position of the minute hand of a clock two minutes before an hour. The Dragon (*Draco*) curls over the Little Bear, curving upward on the east, to where its head, high up in the northeast, is marked by the gleaming eyes, β and γ. Under the Little Bear, the Camelopard has at last come upright.

Low down in the west the Lion (*Leo*) is setting. The point of the "Sickle in the Lion" is turned to the horizon; the handle (marked by α and η) is nearly horizontal. Above the Lion's tail is Berenice's Hair (*Coma Berenices*); and between that and the Great Bear's tail our chart shows a solitary star of the Hunting Dogs (*Canes Venatici*). The Crow (*Corvus*) is low down in the southwest, the Cup (*Crater*) beside it, partly set, on the right. Above is *Virgo*, the Virgin. Still higher in the southwest—in fact, with head close to the point overhead—is the Herdsman (*Bootes*), the Crown (*Corona Borealis*) near his southern shoulder marking what was once the Herdsman's uplifted arm.



In the map, stars of the first magnitude are eight-pointed; second magnitude, six-pointed; third magnitude, five-pointed; fourth magnitude (a few), four-pointed; fifth magnitude (very few), three-pointed, counting the points only as shown in the solid outline, without the intermediate lines signifying star rays.

Low down between the south and southwest we find the head and shoulders of the Centaur (*Centaurus*), who holds the Wolf (*Lupus*) due south. Above the Wolf are the Scales (*Libra*), and above these the Serpent (*Serpens*), his head, in the south, stretching toward the Crown. In the mid-sky, toward the southeast, we find the Serpent Bearer (*Ophiuchus* — one star of the Serpent lies east of him). Below the Serpent Bearer we find the Scorpion (*Scorpio*), now fully risen, and showing truly scorpionicform. Beside the Scorpion is the Archer (*Sagittarius*), low down in the southeast. To his left we see, low down, two stars marking the head of the Sea Goat (*Capricornus*), and one belonging to the Water Bearer (*Aquarius*). Above the Sea Goat flies the Eagle (*Aquila*), with the bright star Altair; and above, near the point overhead, is the kneeling *Hercules*. Due east, we see part of the Winged Horse (*Pegasus*); above that, the little Dolphin (*Delphinus*), and higher, the Swan (*Cygnus*) and the Lyre (*Lyra*), with the beautiful bluish-white star Vega.

Lastly, low down, between north and northeast, we find the Seated Lady (*Cassiopeia*); and above, somewhat eastwardly, the inconspicuous constellation *Cepheus*, Cassiopeia's royal husband.

The Polarity of Tadpoles.

The following, says the *Centralblatt fur Elektrotechnik*, is reported about an interesting experiment of the physiologist Prof. L. Herman. In a flat bowl filled with water, in which a number of 14 days' old frog larvæ (of *Rana temporaria*) were disporting themselves, were sunk along the narrow side, ready for an experiment, thick zinc wires connected with a battery of 20 little zinc carbon elements. When the current was made, the whole of the little animals fell into a wriggling motion, which soon ceased. But all the larvæ without exception had taken up one position, in which the head was turned to the anode and the tail to the cathode. The animals remained in this position till the current was again broken, when they again fell into the wriggling motion, but now less violently. Repeated experiments proved that the living animals showed a decided polarity, placing themselves along the stream lines of a current with their heads all in one direction, this direction being reversed when the current was reversed. An explanation of this interesting phenomenon has not hitherto been given.

ALUM gives excellent results when it has been found desirable to clarify muddy or turbid waters.