A FEW NEW MICROSCOPE ACCESSORIES.

The annexed engravings represent three new and valuable accessories which afford great satisfaction to every microscopist who is fortunate enough to possess them. They are all new, and consequently may not have come under the observation of the reader, but the writer, speaking from his own experience with them, is able to say impartially that they are excellent and very desirable.

Ward's eye shade, shown in Fig. 1, is applied to the tube of the microscope, and permits of removing the eye pieces without changing the shade. This device permits of keeping both eyes open, and renders working with a microscope less fatiguing than it would be were the unused eye exposed to the light or closed.

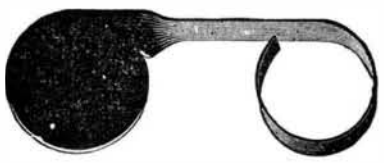
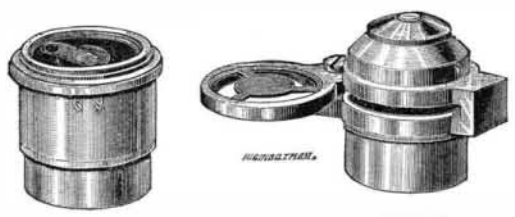


Fig. 1.—WARD'S EYE SHADE.

Fig. 2 shows an improved sub-stage condenser and two forms of mounting. The lenses composing this condenser are very large, and utilize almost all the rays which pass through the sub-stage ring. Its numerical aperture is about 1·42, so that it can readily be used with objectives of the largest angular aperture. The volume of light concentrated by it is quite sufficient with the highest amplification. The light may be concentrated at a single point, or it may be distributed



No. 1. No. 2.

Fig. 2.—NEW SUB-STAGE CONDENSER.

over a larger space by varying its distance from the object. It may be used either dry or with the immersion fluid. The mounting represented in No. 1 is for oblique light. It is provided with a diaphragm, which is moved in a right line across the tube by turning the milled edge, thus giving all angles of light between central illumination and the extreme limit. The mounting shown in No. 2 is provided with a swinging diaphragm ring, in which may be placed various stops or diaphragms without disturbing the adjustment of the condenser. By means of these stops and diaphragms either a dark ground illumination or oblique illumination of any angle may be secured. The graduated blue glass light modifier shown in Fig. 3 consists of a disk of glass which revolves upon a sub-stage adapter, and gives all shades between white and dark blue, both transparent and translucent. The difference in results secured by even a slight modification of the light by means of this graduated blue glass is surprising.

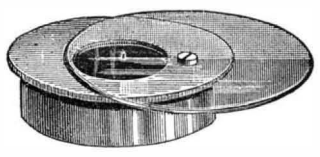


Fig. 3.—GRADUATED BLUE GLASS LIGHT MODIFIER.

These new accessories are made by the Bausch & Lomb Optical Co., of Rochester, N. Y., and 37 Maiden Lane, New York city.

Phosphate in South Carolina.

The *Manufacturers' Record* has an interesting article on the phosphate industry of South Carolina, from which it appears that the total amount of phosphate rock mined in this State since the discovery of these deposits has been as follows:

	Tons.
1868-70	20,000
1871	50,000
1872	60,000
1873	90,000
1874	100,000
1875	115,000
1876	135,000
1877	165,000
1878	210,000
1879	200,000
1880	190,000
1881	265,000
1882	330,000
1883	355,000
1884	409,000
Total	2,699,000

Of this amount there was:

Of river rock	1,229,170
Of land rock	1,469,830
Total	2,699,000

The total, 2,699,000 tons, represents a value of about $16,000,000. In the amount of capital invested South Carolina stands second, with Maryland first. New York follows South Carolina.

PHOTOGRAPHIC NOTES.

Distortion in Photographs.—Some recent investigations conducted by the *British Journal of Photography* show conclusively that distortion in photograph prints is largely due to carelessness in mounting them. This was proved by taking strips of photograph paper, some two feet long and a few inches wide, coating them on the back or plain side with the ordinary starch paste, and then laying them upon the heavy card mounts. If the paper was simply pressed down gently upon the mount and run through a pair of iron rollers, the extension of the length was but one-eighth inch. But if the surface of the print was rubbed in the direction of its length on to the mount, the degree of extension was increased one inch. The conclusion reached was that prints should be pressed on the mounts with a soft pad of cloth, and not rubbed lengthwise. We have seen instances in portrait photographs where the distortion was so marked as to greatly change the looks of the person. The negative was correct, but the paper in being printed and mounted had expanded, and distorted the picture.

The Development of Paper Negatives.—At a recent demonstration made by Mr. David Cooper and S. C. Jones before the Society of Amateur Photographers, of this city, on the development of paper negatives made upon the Eastman bromo-silver gelatine paper, an interesting point about their manipulation was brought out.

The strip of paper had upon it eight or ten instantaneous exposures of marine subjects; the different views prior to development in the dark room were separated from each other, and one by one immersed for a few seconds in a water bath, and then placed in a very weak developer made up as follows:

Water	36 ounces.
Pyrogallic acid	30 grains.
Sulphite soda (crystals)	180 "
Carbonate of soda (granulated)	110 "

After the tenth print had been placed in the above, the first sheet commenced to show signs of developing, and it was curious, to one who is accustomed to develop a dry plate, to watch Mr. Cooper handle each sheet as if the developer was a toning bath, that is, they were picked out, then dropped, and kept moving about in the solution.

After a period of ten minutes it was noticed that the images had developed out very fully, but on examining them by transmitted light they were quite thin and flat, looking apparently as if they had been overexposed.

At this point the following addition was made to the developer, from the solutions described below equivalent to

Carbonate of soda	110 grams.
Pyrogallic acid	64 "
Sulphite soda	360 "

Which, it was stated, would act as an intensifier, and bring the negatives up to the proper strength. This it appeared to do quite rapidly, and as the negatives gained sufficient density they were, one by one, gradually removed from the developer, rinsed with water, and placed in an alum and then in a hypo fixing bath. As the paper was not as transparent as glass, it was necessary, in judging the density, to allow the negatives to appear 1½ times more dense than they would if on glass. The slow method of development was considered advisable, as it gave the operator more time to examine the negatives during development; and as they could be easily brought up to their proper density afterward by the addition of a stronger developer, the plan was a perfectly safe one.

The negatives produced at the meeting developed out as if fully exposed, and possessed fine, vigorous printing qualities.

Below we give the formula just as Mr. Cooper mixes the parts of his normal developer.

No. 1.

Sulphite sodium, pure (480 grs. to oz.)	6 ounces.
Distilled or boiled water	32 "
Pyrogallic acid	480 grains.

No. 2.

Carbonate soda, pure (437 grs. to oz.)	4 ounces.
Water	32 "

Heretofore one ounce of Nos. 1 and 2, mixed with one ounce of water, has been advised as the normal developer, and in it the image should appear in twenty seconds. A few drops of a restrainer, composed of—

Water	6 ounces,
Bromide of potassium	1 ounce,

is used if the picture appears too quick and is flat.

When several negatives are to be made at one time, the former method of development is preferred.

A Large Photograph.—We were recently shown one of the largest instantaneous marine photographs that has probably been made in this country, taken, it is stated, with a Dallmeyer rapid rectilinear lens and an extra quick improved camera shutter, upon a Stanley gelatino-bromide plate, 17 x 22 inches in size.

The subject is the English yacht Genesta under full sail; every detail is brought out, and not a single defect observable upon so large a surface, which illustrates how perfectly plates can be made. The size of the image is over 11 inches each way. We are indebted to Messrs. E. & H. T. Anthony & Co., of this city, for a copy of this fine picture.

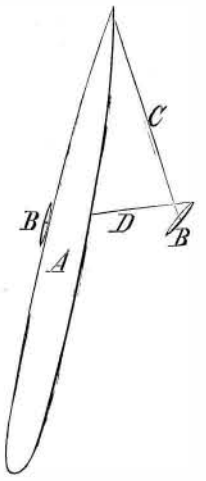
IMPROVED STEERING APPARATUS FOR RUDDERLESS SHIPS.

We are idebted to Captain John P. Roberts, of Shanghai, China, a seafaring commander of long and varied experience, for the accompanying diagram and description of an improvised steering gear that enabled him to round the Cape of Good Hope in a gale with a high, confused sea, and bring his rudderless ship safely into a narrow and difficult harbor.

We quote from Captain Roberts' log as the clearest method of placing his steering apparatus before the readers of the SCIENTIFIC AMERICAN:

"CHINA SEA, July 1, 1875.

"Finding that a heavy sea had carried away our rudder, took a four inch line from each bow, brought the ends aft to midships, and bent them to spar buoys four feet from the forward end each, the spars being ten feet long. Bent ratline stuff to the forward ends for tripping lines, and put the contrivance overboard with the tripping lines shortened in and made fast on deck to keep the spars alongside (the steamer lying in the trough of the sea, pitching heavily); started ahead at full speed, and slacked away the port tripping line.



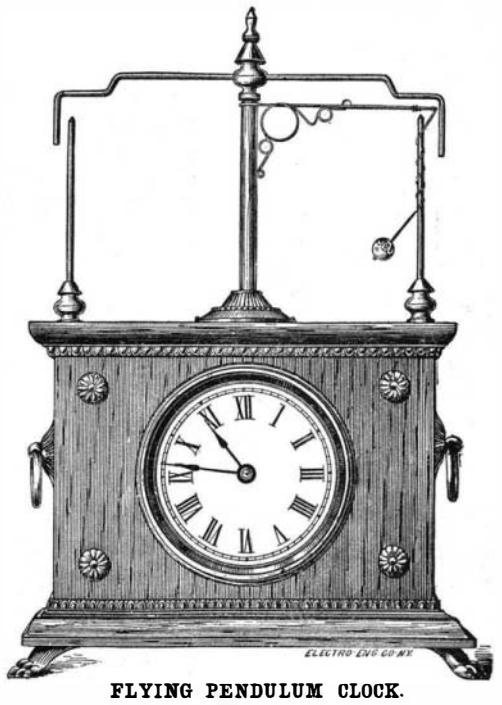
"The spar shot out until its tow rope formed an angle of about forty-five degrees with the central line of the steamer, pulling her head round rapidly. When nearly up to our course, hauled the spar gradually alongside, and by slacking away and hauling in on each side of the steamer, steered quite as well as could be done with a rudder."

This simple contrivance of Captain Roberts' would seem to solve the problem as to how ships may be steered, having lost their rudders, the means being at hand on board all steamers to be quickly utilized and put in operation.

Referring to the diagram, a clear understanding of this apparatus and the manner of applying will be readily obtained. A, steamer; B, spar; C, strong rope; D, small tripping line. Slacking away B from the starboard side is equivalent to porting helm, and *vice versa*.

A NOVEL CLOCK.

The flying pendulum clock shown in the engraving exhibits a curious application of a phenomenon observed by almost everybody, but never before suspected of availability in a clock escapement. The boy who first whipped saplings and hitching posts with his string carrying at the end a horse chestnut, had the crude principle which the inventor has ingeniously embodied in this clock.



FLYING PENDULUM CLOCK.

The central vertical spindle tends to revolve continuously by virtue of its connection with the driving gear of the clock, but when the arm which it carries swings half way round, the little spherical weight, suspended from it by a thread, is thrown outward by centrifugal action; and when the thread touches one of the fixed vertical wires at the side of the clock, the momentum of the spherical weight causes it to wind the thread around the vertical wire and stop the arm and spindle. As soon as the thread is wound upon the spindle, the spherical weight unwinds it by its own gravity, and in so doing receives enough momentum to rewind the thread and still prevent the spindle from revolving. Then the thread winds and unwinds once more, when the arm is released, and makes a half revolution, when the thread is wound on the other vertical wire, and the operation just described is repeated. Made by the New Haven Clock Company, 16 Park Place, New York city.