last would have great definition, but its field being so limited it would lose it, with the least vibration of the instrument.

"If the relative size is kept within proper limits, all things being equal, density and clearness of glass, etc., the instrument which has the longest focus, although of small aperture, is the most powerful and will do the best work.

"I give the length and aperture of a few of the principal telescopes, makers' names, and where erected :—

Maker.	Where Erected.	Length in feet.	Aperture in inches.
Dien	Universal Expos., 1855	42.0	22
Porro	Paris	49.3	20½
Mertz	Expos., 1867	25.8	18
"	Pulkowa	21.4	15½
Secretan	Paris Observatory	16.8	12
———	Munich "	16.8	11½
Mertz	Copenhagen	18.3	11½
"	Roman Coll. Equatorial	14.6	10
Frauenhofer	Dorpat	15.1½	9½
Lerebours	Paris	11.0	9½

"In the construction of a cheap telescope, the objective is the only part on which to make any considerable outlay. Suppose an achromatic lens of 36 inches focal length, 2¼ inches in diameter, has been chosen, and that we wish to mount it permanently. We *will* make the cells of mahogany, cherry, black walnut or hard maple (mine are of lignum vitæ) well seasoned and varnished inside and out to protect them from absorbing moisture from the air; a wood turner will furnish wood and turn three pieces for about $1.50. For a focussing tube get a piece of brass tubing, 12 inches long by 1¼ inch outside diameter; a tin tube would be a cheap substitute.

"The eye-piece (fig. 2) is turned to fit inside this tube; a recess in the collar of the eye-piece will admit to glue in it a piece of felt or cloth, to keep it from falling out. A piece of wood, 3¼ inches in diameter, is bored out lengthwise, a little larger than the focussing tube. It is put on a wood mandril, centred and turned, as shown in fig. 2. It should be about 5 inches long and have a piece of felt, cloth or velvet glued at each internal end, so as to confine the friction to those parts only.

"An arrangement for focussing is made as indicated in figures 2 and 3. The tube is slightly filed across so as to give it sufficient grip for the rubber-covered spindle to move it back and forth. The objective is secured in its cell (fig. 4) against a shoulder, from the front, by a piece of spring-wire bent in the shape of a ring. This facilitates the removal of the objective without removing the cell.

"To make the body of the telescope, take a piece of wood about 3 inches diameter and 33 inches long. Turn it into a roller. Upon this roll a piece of pasteboard, previously thinned on the longitudinal edges and pasted or glued on the outside. Secure until dry; before taking it off the wood roller it would be well to cut the ends of the paper tube 31 inches long on a lathe so as to ensure the mounting of the cell and collar (fig. 2) centrally. The cell is secured at one end of the tube by three round head screws and the collar in the same way at the other end. Four round head screws toward the tapered end of the collar regulate the axis of the focussing tube in line with the objective. Insert into each end of the brass or tin tube, a disk of cardboard having a pinhole centre, remove the objective from its cell and replace it by a similar disk with central pinhole. Place a light (this had better be done at night) in front of the objective end of the telescope, now work the four screws, until, when looking through the eye-piece end of the tube the three pinholes coincide and show a small star-like light in the objective disk. The astronomical or celestial eye-piece is composed of two plano-convex lenses with their convex side toward the objective. "A" (fig. 2) is called the eye-glass. "B," the field-glass. The eye-glass should be one inch focus, and one-half inch in diameter; the field-glass, 2 inch focus, and ¾ of an inch in diameter. These should be placed in the cell at a distance of 1½ inches apart, with a diaphram ("C,") having an opening of about ⅜ inch placed a little in front of the focus of the eye-glass. When observing the sun, use a piece of black glass, cut out of the side of a flat bottle, as described by Mr. W. H. Smith in No. 2 of Astronomy and Meteorology, secured against the flange "D" and held by a ring of spring wire. The lenses and diaphram are also secured in their cell in the same way. Figure 5 shows the perspective view of the rubber pressure roll for focussing; a mortice is made in the collar (fig. 2) to receive it, and the spindle; a piece of wood is shaped, as shown at "E." It is hollowed out underneath so as not to interfere with the rubber roll; a piece of thin brass or tin is perforated and bent, as shown by figure 6, passed under the body of the telescope and is secured in its place by a screw, after the tube is found to work smoothly.

"A pedestal is made of pine, 4 feet 3 inches high, 3 x 3 inches square, and braced as indicated by figure 1. Two inch pine will answer for the base and 1 inch for the braces. The vertical movement is shown at "F," (fig. 3) and the horizontal at "G."

"Such an instrument can be made (if one has sufficient skill to mount it himself) for about $10. It will give, if properly mounted, as good results as one of the same size, catalogue price in Paris $28.00, without pedestal, which, laid down in Canada or the United States, would cost about $12 more. It would bear a terrestial eye-piece of 35 and an astronomical one of 90.

"A still cheaper mode of mounting would be to make the paper tube as above, slightly larger than the diameter of the objective, and to glue internally, near end, a strip of pasteboard as a shoulder for the lens to rest against, a piece of pine would do for the collar, a tin tube for the focussing tube or even a paper tube, if shellacked, would answer. The eye cell can be made of pasteboard, with sections of lead pipe as flanges for the lenses. A cardboard diaphram between the lenses as indicated in figure 2. Great care will have to be taken to mount the lenses of the eye-piece centrally and perfectly parallel on their flat sides. The body of the telescope may be painted or covered with bookbinder's cloth or paper and varnished; while the inside of it should be blackened as well as the cells and focussing tube with a mixture of lampblack, spirits and shellac.

"Although not indispensable, a finder, "K," (fig. 1) should be provided for this instrument, as it is very difficult to bring an object into its field when using a high power. A good substitute for a finder is the toy telescope; a fifty cent one is attached to the body of the telescope by means of straps or other devices. After focussing the telescope on a very small distant object, which should be in the centre of its field, focus the toy telescope on the same object and when both are central, secure.

"Such is the astronomical telescope in its cheapest form; is it not astonishing that such a little outlay will secure the enjoyment of seeing several celestial wonders, such as the craters of the Moon, the phases of Venus, the satellites and belts of Jupiter, the ring of Saturn, the spots on the Sun, beside some of the double stars and nebulæ.

"In conclusion, I would strongly advise you, by all means, to get a telescope, however small it may be. You will love the science of astronomy the more you see, and the more powerful the eye you use, the more enjoyment you will have.

"My intention, when I first thought of this subject, was to fully investigate the powers of small telescopes and what they reveal, but as this was recently so ably treated by our President in his paper on "Small Telescopes and What They Reveal," read before our Association and published in the May number of Astronomy and Meteorology, I consider my task ended. I can only add that my reward will be great if I have succeeded in convincing you to try your skill in constructing a telescope.

The discussion on this paper closed by the President informing the meeting that the lowest estimate for lithographing and furnishing 500 copies of the diagrams was about $9.00, an outlay which the present straitened conditions of the finances as regards Astronomy and Meteorology did not warrant.