

*Bardou & Son*

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THE  
TELESCOPES  
OF  
BARDOU & SON  
PARIS, FRANCE



THE TELESCOPES  
OF BARDOU & SON  
PARIS



**THE MOON AT NINE AND THREE-QUARTER DAYS**

*From a Photograph taken at the Yerkes Observatory. Illustration, by courtesy of  
G. P. Putnam's Sons, from "A Beginner's Star-Book" by  
Kelvin McKreedy; see p. 12 of this Catalog.*

The Telescopes  
of Bardou & Son

PARIS, FRANCE

*For Index, See Final Page*

For Institutional and Private Use,  
for Schools, for Country Houses and for Hotels,  
and for Astronomical Observations.

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# THE TELESCOPES OF BARDOU & SON

## INTRODUCTORY

**A**MONG the high grade telescopes now presented to the public, no instruments have become so widely or so deservedly popular as those manufactured by the famous house of Bardou & Son, of Paris. Their large experience has been reinforced by progressive methods, and by their command of the skilled workmanship for which France has been long distinguished. The facilities which have made it possible for them to place their output within reach of the average purchaser have also made possible the consistent improvement of their instruments. So positive has been this advance in quality that they confidently offer their present models in comparison with any other instruments of like size and price.

This policy of the great French house,—a policy of high quality at reasonable prices, is justified by large and increasing sales to a clientèle which has for many years been international in character. That the popularizing of instruments of precision is not inconsistent with the highest standards is well illustrated by the history of many of the most remarkable developments of the past century. It is safe to say that no commander on the field of Waterloo (1815) had as good a watch as that worn to-day by the average student in an American college. It is also interesting to note that the photographic camera,—in spite of the optical and practical difficulties presented—has long ceased to be the mere instrument of a profession; it has become an instrument of the people.

The telescope in its turn is passing through a like process of adaptation. It, too, is ceasing to be the mere instrument of a profession and is becoming an instrument of the people. This result is due not only to the increasing breadth of our popular interests but to the genius of those who are now successfully solving the optical and commercial problems involved. Among the agencies which are thus refining and stimulating the pleasure of

seeing, and which are therefore enlarging and enriching the interests of every-day life, the house of Bardou & Son will take high rank.

What will such a telescope do? What can be accomplished with such an instrument—a telescope of good quality, but within the means of the average man? Very much more than is commonly supposed. The impression that successful observation is wholly dependent on large and expensive instruments is a mistake. The telescope with which Galileo made his most critical discoveries and with which he showed to the poet Milton “the Moon” with “new lands or mountains in her spotty globe” was inferior to an ordinary spy-glass. In our own century Dr. Anderson of Edinburgh, discoverer of the superb new temporary star in Perseus, had no equipment at the time but a good celestial atlas and one of the smallest of telescopes. The range of the instruments described in the present catalog will bring satisfaction both to the beginner and to the advanced student. And as the beginner gradually gains familiarity with his instrument, his knowledge, also, of the things to be seen, and of the hours and places in which he can see them best, will quickly grow into a real possession.

First of all, however, let it be understood that each of these instruments has a terrestrial, as well as a celestial (or astronomical) eye-piece. The terrestrial eye-piece, as the name implies, is for observing objects on the earth, usually by day. A telescope so fitted is an interesting adjunct to every country home, whether by the seashore, the lakeside, or in the mountains. Its easy command of the far ranges of life and scenery will make its use a constant occasion of varied amusement and information. This advantage is offered to the purchaser of the Bardou telescope without extra cost. The terrestrial eye-piece is listed with many lines of telescopes as an “extra,” costing from \$10. to \$15. each. But with the Bardou telescope such eye-pieces—permitting the interesting use of the instrument by day—are included in the regular equipment.

The astronomical eye-pieces provided with these instruments are for the observation of the sun, the moon, the planets, the fixed stars, star-clusters, nebulae, comets, etc. Take for example

the standard instruments listed as Nos. 5811, 5816, 5821, and 5826. These are known as "three-inch" telescopes: a "three-inch" telescope is one in which the lens at the large end is three inches in diameter. It represents a type peculiarly adapted to popular use.

A. The Bardou "three-inch" (No. 5811, p. 11; No. 5816, p. 13; No. 5821, p. 15; No. 5826, p. 17) will show even to the beginner, when intelligently employed by the normal eye,—more than three hundred objects upon our Moon's surface; the Moon's so-called "seas," its mountain ranges, "craters," rills, the mysterious "lines of radiation" from the regions of the huge volcanic formations known as Tycho, Copernicus, etc. It will show the planet Uranus, indistinguishable from a small star to the unaided eye. It will show also the "cloud belts" upon the planet Jupiter, and four of his attendant moons; Saturn, the ring-formation surrounding that planet, and at least one (sometimes two) of the satellites; Venus and her crescent phase—at the times in the year when she assumes this aspect of the new moon; Mars, and, when the planet is in good position, the polar markings. The "canals" (so-called) are apparent only in very large telescopes. It will reveal the spots upon our Sun; the nebulae of Orion, Andromeda, etc.; the star clusters of Perseus, Gemini, Hercules, Cancer, etc.; the quadruple star, Theta ( $\theta$ ), in the Orion nebula. The instrument will also separate the components of such double stars as the Alpha ( $\alpha$ ) in Ursa Minor, known as the Pole Star; Zeta ( $\zeta$ ) or Mizar, in Ursa Major; Alpha ( $\alpha$ ) in Hercules; Gamma ( $\gamma$ ) in Leo; Castor in the constellation Gemini; Gamma ( $\gamma$ ) in Andromeda—showing here as in many other cases—the beautiful and contrasted colors of the components; Beta ( $\beta$ ) in Cygnus; Beta ( $\beta$ ) and Nu ( $\nu$ ) in Scorpius; Theta ( $\theta$ ) in Serpens; Gamma ( $\gamma$ ) in Delphinus; Delta ( $\delta$ ) and Iota ( $\iota$ ) and the pretty triple called Sigma ( $\sigma$ ) in Orion; Lambda ( $\lambda$ ) and Gamma ( $\gamma$ ) in Aries—and others, too numerous for brief specification. Thickly massed aggregations of stars, such as the Milky Way, and the naked-eye clusters like the Pleiades and Hyades, become—when viewed with low power eye-pieces—indescribably rich and brilliant.

B. The Bardou Telescope in the next larger size has an "objective," *i.e.*, the lens in large end of telescope,  $3\frac{1}{4}$  inches in diameter. These instruments (No. 5827, p. 17; No. 5830, p. 19; No. 5840, p. 21) will show all the objects noted in the preceding paragraph; and will show, in addition, more of the markings upon Jupiter; Saturn in more detail and with two, sometimes three, satellites; more of the detail of our own Moon; the disks of Neptune and of Uranus—though these smaller planets are not impressive objects in any telescope, however large; and will give, with similar eye-pieces or eye-pieces of equivalent power, a larger field of view and more effective illumination than can be afforded by the preceding sizes. In addition to the double stars



already noted, it will separate many stars of greater difficulty, such as the Beta ( $\beta$ ) of Orion (Rigel) and the double-double star Epsilon ( $\epsilon$ ) of Lyra, showing it as a quadruple. These latter stars can also be divided by the "three-inch" instrument, if the atmospheric conditions are good and the eye of the observer has had some little training in observation.

C. The next larger size, with objective, *i.e.*, lens at larger end of telescope,  $3\frac{1}{2}$  inches in diameter (No. 5831, p. 19; No. 5841, p. 21), will reveal all the objects noted in paragraphs A and B, showing them under still better conditions as to brightness of illumination and breadth of field. In addition, these instruments will indicate Cassini's division between the rings of Saturn; additional markings upon Jupiter and Mars; and many double stars inseparable by smaller telescopes.

D. The next larger sizes here listed, object lenses  $3\frac{3}{4}$  to  $4\frac{1}{4}$  inches in diameter (Nos. 5832, 5833, 5834, p. 19; Nos. 5842, 5843, 5844, p. 21), make feasible the use of still larger magnifying powers; and, with all their lower power eye-pieces, the breadth of field and the brilliancy of illumination are, of course, proportionately greater. They will reveal all that can be seen with the instruments heretofore described, and they will indicate, in addition, such interesting objects as the companion stars to Aldebaran, Vega and Antares. They will also divide many other double stars inseparable by smaller telescopes. They will show, also, from four to five of the moons of Saturn. The large light-gathering capacity of their object lenses when utilized by the lower powers (in the series of eye-pieces provided with them) makes these instruments especially effective in the study of the nebulae of the sky. Some of the more difficult star clusters which are visible but not impressive in smaller instruments, become—in these larger telescopes—of striking interest and beauty. Each increase in the size of the instrument involves an increase in power, in light, and in breadth of field.

In noting the optical range and capacity of the Bardou telescopes we have purposely understated their efficiency. The observer who possesses some practical experience and who has the advantage of a trained eye will find that these instruments will more than meet his legitimate expectations. The beginner, upon the other hand, will also find that in quality, range and scope, they surpass the claims made for them. Upon the first use of a telescope, however, the beginner sometimes has a sense of disappointment—no matter how superb the actual quality of his glass. The whole subject is new to him. He is making unac-

customed demands not merely on the telescope but on his own eyes and on his own mental experience. With a little patience and care he will soon be astonished at his progress. He will find that some of his eye-difficulties are purely muscular and will pass away—as the eye becomes used to the new tasks imposed upon it; and that his vision will become stronger, steadier, and clearer. He will come also to a better understanding of his instrument. He will recognize its limitations and adjust himself to them,—and he will find that these limitations are not escaped by turning to larger telescopes and higher powers—for these, too, possess limitations which for a beginner are quite as puzzling as any. But in his use of his telescope, no matter how small, he will find many satisfactions, also,—resources of increasing pleasure and profit, and he will soon learn to utilize these to the utmost. A few practical suggestions will be found on p. 25.

As to the mechanical equipment of the instruments here listed, it only remains to be said that they bear evidence, in stability, precision and attractiveness, to the same care and skill which have so long guaranteed the optical excellence of the output of the factories of Bardou & Son. The tripods furnished are of the best hard woods, carefully selected and highly polished.

For a brief description of extras, accessories, etc., see p. 22. They are listed in the present catalog because of the desire of the manufacturers to meet the demand for a broad and varied assortment of special eye-pieces. These are carried in stock by their New York representatives and may be obtained without the long delay of special importation. At the same time it is well to remember that any telescope here listed is fully adapted, without extras, to the requirements of the average observer. And as the cost of a terrestrial eye-piece far exceeds the cost of an astronomical or celestial eye-piece, the eye-pieces, etc., regularly offered here with each instrument, comprise a far more expensive equipment than is usually provided with telescopes of the same size and type. The policy of the manufacturers has been to make of each telescope an instrument reliable in quality and moderate in price, fully equipped—even without extras—for good work by night or day.

## BARDOU TELESCOPE No. 5811



Y many of the clients of the Bardou Telescopes this model has long been regarded as a satisfactory and serviceable instrument at very moderate cost. The size of the object lens is 3 inches in diameter. The body of the telescope, the sliding tube for eye-pieces, etc., etc., are of polished brass. The instrument is also provided with sun-glass, and rack and pinion focusing adjustment, and is mounted on large hard-wood tripod. Three eye-pieces are furnished,—one terrestrial eye-piece magnifying 45 times; and two astronomical eye-pieces, one magnifying 50 times, one magnifying 114 times. Telescope tube and all eye-pieces included in neat wooden box. For the performance of this instrument, see par. A, p. 7. For such extras as may be desired, see pp. 23, 24.

## BARDOU TELESCOPES No. 5800 and 5810

These instruments are similar in construction and design to the above, but are smaller in size. No. 5800 has an aperture (diameter of object lens) of  $2\frac{1}{4}$  inches; furnished with three eye-pieces; one terrestrial eye-piece magnifying 32 times; and two astronomical eye-pieces, one magnifying 37 times, one 86 times. No. 5810 has an aperture of  $2\frac{3}{4}$  inches; furnished with three eye-pieces; one terrestrial eye-piece magnifying 38 times; and 2 astronomical eye-pieces, one magnifying 45 times, one 102 times. For extras, etc., see pp. 23, 24. The performance of these instruments is only slightly smaller in range than No. 5811; see above.

## THE TELESCOPE IN THE HOTEL

Modern hotels, especially in the mountains and at the seashore, are increasing their popularity and adding to the pleasure of their guests by the purchase of telescopes for use on balcony, veranda or roof. Aside from their value at night in observing the moon, the stars, or a chance comet, they are of special interest by day for the viewing of scenery or the watching of distant ships.



BARDOU TELESCOPE No. 5811  
Also No. 5800 and No. 5810

These are similar in construction and design, differing chiefly in size, power of eye-pieces and price. Telescope No. 5811; Diameter of object lens, 3 inches; length when closed, about 39 inches; extended, about 59 inches; price, \$80. Telescope No. 5800; Diameter of object lens,  $2\frac{1}{4}$  inches; length when closed, about 32 inches; extended, about 50 inches; price, \$65. Telescope No. 5810; Diameter of object lens,  $2\frac{3}{4}$  inches; length when closed, about 37 inches; extended, about 57 inches; price, \$72. For further particulars as to these instruments, see the page opposite.

## BARDOU TELESCOPE No. 5816



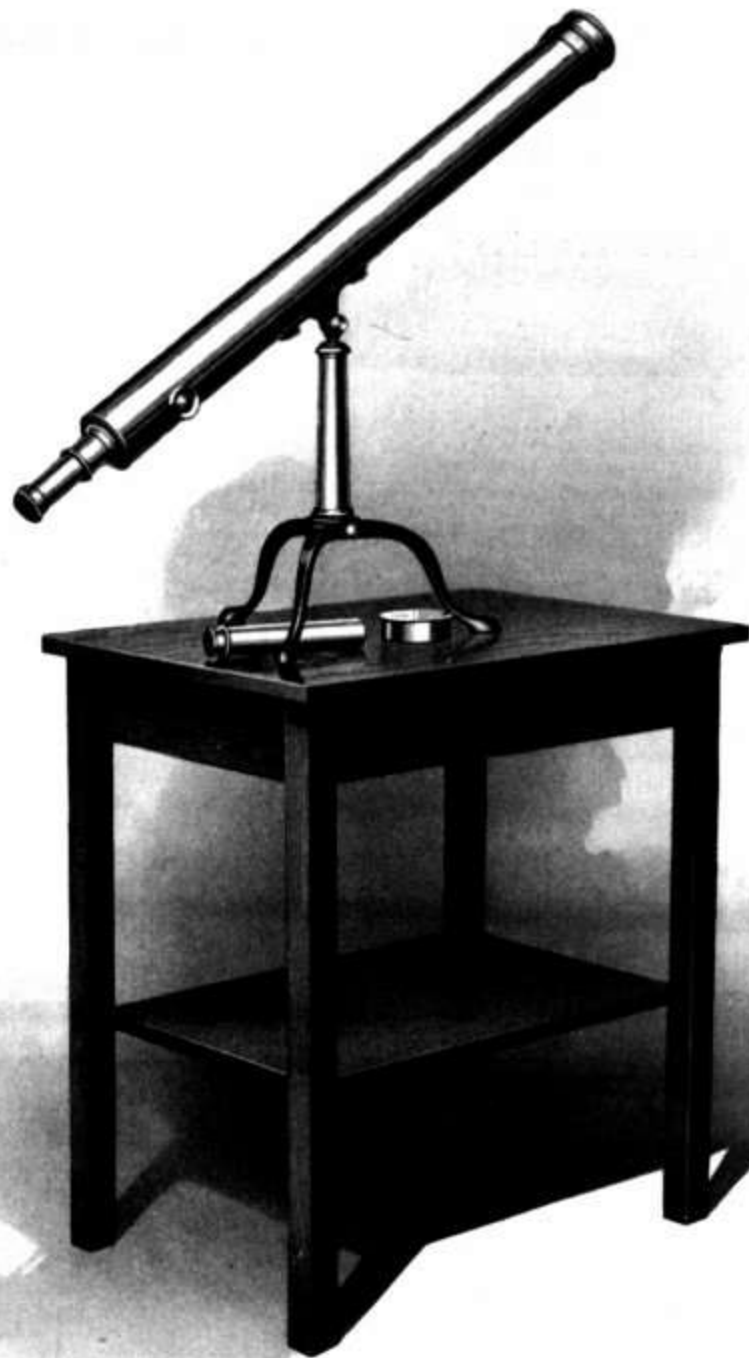
ALTHOUGH light in weight and especially convenient under circumstances which make the portability of an instrument the prime consideration, this telescope has the same high optical qualities as the model next shown, No. 5821. Body of telescope, sliding tube for eye-pieces, and tubular support for table tripod, are of polished brass. Feet of tripod are wrought steel, japanned. Sun-glass; brass cap for protection of object glass; and rack and pinion focusing adjustment. Three eye-pieces are furnished; one terrestrial eye-piece, power 45; and two astronomical eye-pieces, powers 50 and 114. Telescope is inclosed with table tripod in neat wooden box. For the performance of this instrument see par. A, p. 7. For extras that may be desired, see pp. 23, 24.

## BARDOU TELESCOPE No. 5815

This instrument is identical with the above except that it is slightly smaller in size and the eye-piece equipment is somewhat different. The diameter of the object lens is  $2\frac{3}{4}$  inches. Three eye-pieces are provided; one terrestrial eye-piece, power 38; and two astronomical eye-pieces, powers 45 and 102. Instrument is inclosed with table tripod in neat wooden box. The performance of this telescope is but slightly lower than the above. For extras that may be desired, see pp. 23, 24.

## THE MOON IN THE TELESCOPE

The moon as viewed with a low-power eye-piece in a small telescope is an object of great interest. Few who have not observed the moon in this way can appreciate the full beauty of the scene. While the photograph from which our frontispiece is taken was made by a larger instrument, the moon's aspect can be viewed and studied substantially as there shown, through any of the telescopes listed in this catalog. The chief objects are named and described in Kelvin McKready's volume "A Beginner's Star-Book," G. P. Putnam's Sons, New York.



BARDOU TELESCOPE No. 5816

(Also No. 5815)

These are similar in design and equipment, differing only in size, powers of eye-pieces and price. Telescope No. 5816; Diameter of object lens, 3 inches; length when closed, about 39 inches; extended, about 59 inches; price, \$85. Telescope No. 5815; Diameter of object lens,  $2\frac{3}{4}$  inches; length when closed, about 37 inches; extended, about 57 inches; price, \$75. For further particulars as to these instruments, see the page opposite.

## BARDOU TELESCOPE No. 5821



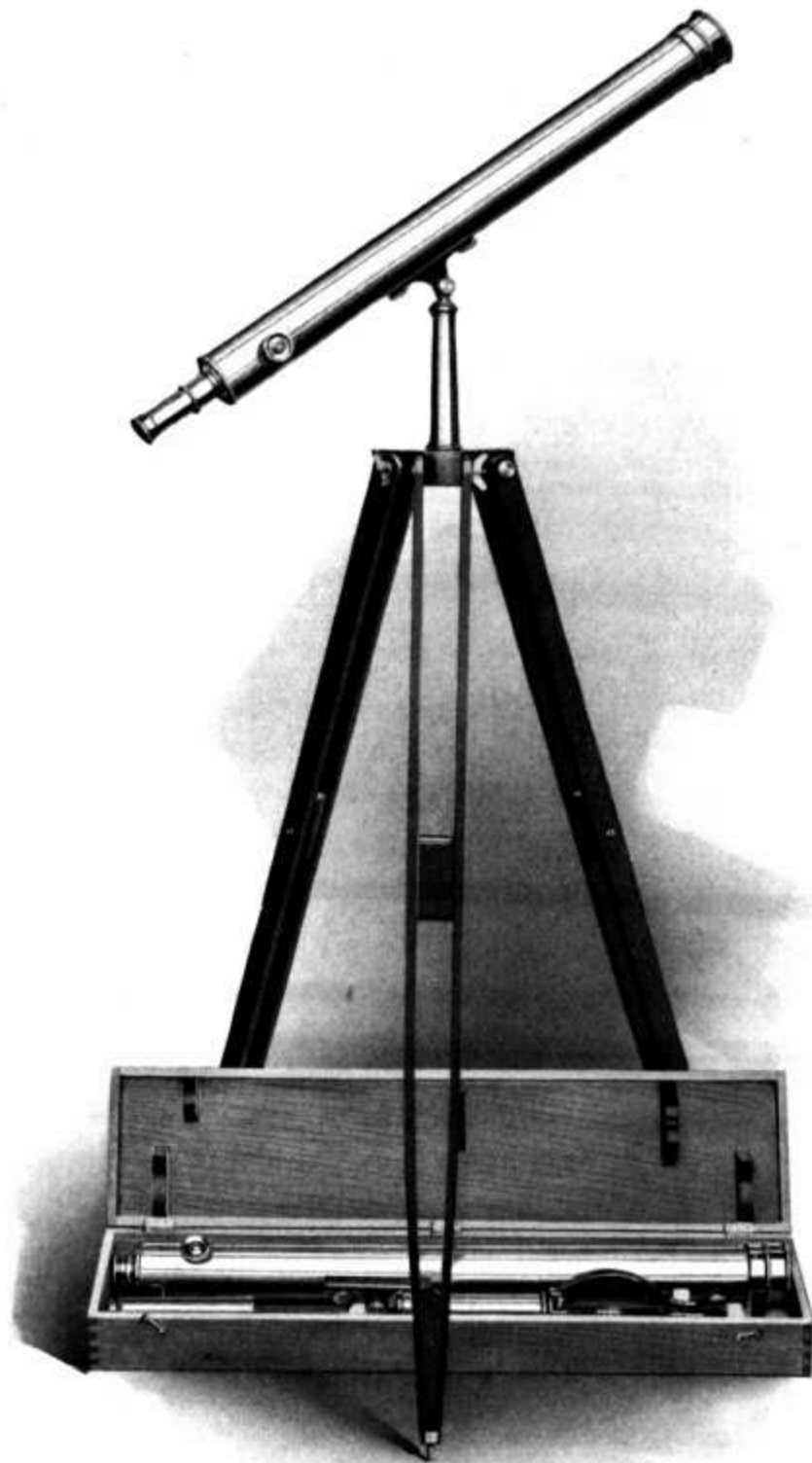
RETAINING all of the features of telescope No. 5816, illustrated on the preceding page, this instrument (No. 5821) includes, in addition, a large hardwood tripod as here shown. The smaller table tripod is also provided, fitting neatly into the box when not in use, as in illustration. Body of telescope, sliding tube for eye-pieces, and tubular support—connecting with either tripod—are all of polished brass. Instrument has detachable sun-glass, brass cap for protection of object glass, and rack and pinion focusing adjustment. Its optical qualities are especially fine, making it admirably adapted to the work of the student or of the exacting private observer. Three eye-pieces are furnished; one terrestrial eye-piece, power 45; and two astronomical eye-pieces, powers 50 and 114. For the performance of this instrument see par. A, p. 7. For extras that may be desired, see pp. 23, 24.

## BARDOU TELESCOPE No. 5820

This instrument is identical with the above, except that it is slightly smaller in size, and the eye-piece equipment is somewhat different. The diameter of the object lens is  $2\frac{3}{4}$  inches. Three eye-pieces are furnished; one terrestrial eye-piece, power 38; and two astronomical, powers 45 and 102. The instrument includes both forms of tripod as described above. The performance of this telescope is but slightly lower than No. 5821. For extras that may be desired, see pp. 23, 24.

## THE TELESCOPE IN THE HOME

Even where there is no professional interest in astronomy, the telescope may give much pleasure in the home. This is especially the case at the country-house, or even in the city—if there be access to veranda or lawn, or to a convenient and comfortable roof. The table-stand tripod illustrated on p. 13 and furnished with Nos. 5816, 5815, 5821, 5820, also provides a convenient means of viewing landscape or sea-scape from the window,—the telescope thus forming a useful and convenient table-piece. Distant objects by day or by night can be brought into view, habits of observation cultivated, and hours of leisure filled with broadening interests. This instrument, like all the others listed in this catalog, is well adapted to the needs of the amateur astronomer.



BARDOU TELESCOPE No. 5821

(Also No. 5820)

These telescopes are similar in construction and design, differing only in size, eye-piece equipment and price. Telescope No. 5821; Diameter of object lens, 3 inches; length when closed, about 39 inches; extended, about 59 inches; price, \$95. Telescope No. 5820; Diameter of object lens,  $2\frac{3}{4}$  inches; length when closed, about 37 inches; extended, about 57 inches; price, \$85. For further particulars as to these instruments, see the page opposite.



## BARDOU TELESCOPE No. 5826



ESPIE the greater focal length and the more elaborate mounting of these instruments, their cost is still kept within moderate limits as compared with other telescopes affording the same advantages. The tripod, as here shown, is especially designed for stability and strength, and is furnished with a simple but effective cranking adjustment for increasing or decreasing the height of the telescope. It is made of finely finished mahogany. Where the portability of the instrument is not an essential and the additional weight is no objection, this type of tripod has much to commend it. Its construction insures rigidity, and affords special steadiness to the telescope. Each of these telescopes includes a sun-glass; and three eye-pieces, one terrestrial and two astronomical. The power of the terrestrial eye-piece is 54; the powers of the astronomical eye-pieces are 60 and 120. The size of the object lens is 3 inches. The telescope body, with cap, is of polished brass. The instrument is furnished in wooden box, with handle, lock and key. For its performance, see par. A, p. 7; but it should be borne in mind that because of its greater focal length, its efficiency is slightly greater than the standard there indicated. For extras, see pp. 23, 24.

## BARDOU TELESCOPE No. 5827

This instrument with its accompanying tripod is in all respects like the above, except that the object lens is  $3\frac{1}{4}$  inches instead of 3 inches, and it is somewhat larger in size. The magnifying power of the terrestrial eye-piece is 59; the powers of the astronomical eye-pieces are 65 and 130. For the performance of this instrument, see par. B, p. 7. For such extras as may be desired, see pp. 23, 24.

## THE TELESCOPE IN THE SCHOOL

Many of the interesting things of astronomy may be learned from books. There is a growing tendency, however, to illustrate and supplement such knowledge by some personal experience in actual observation. The use of the telescope awakens enthusiasm and re-enforces the text-book. A good telescope may now be added at moderate cost to the equipment of any school. These instruments are quickly understood, easily cared for, and compactly stored when not in use.



BARDOU TELESCOPE No. 5826

(Also No. 5827)

These are similar in design and construction, differing only in size, price and optical equipment. Telescope No. 5826; Diameter of object lens, 3 inches; length when closed, about 46 inches; extended, about 63 inches; price, \$150. Telescope No. 5827; Diameter of object lens,  $3\frac{1}{4}$  inches; length when closed, about 48 inches; extended, about 68 inches; price, \$195. For further particulars, see page opposite.

## BARDOU TELESCOPE No. 5830



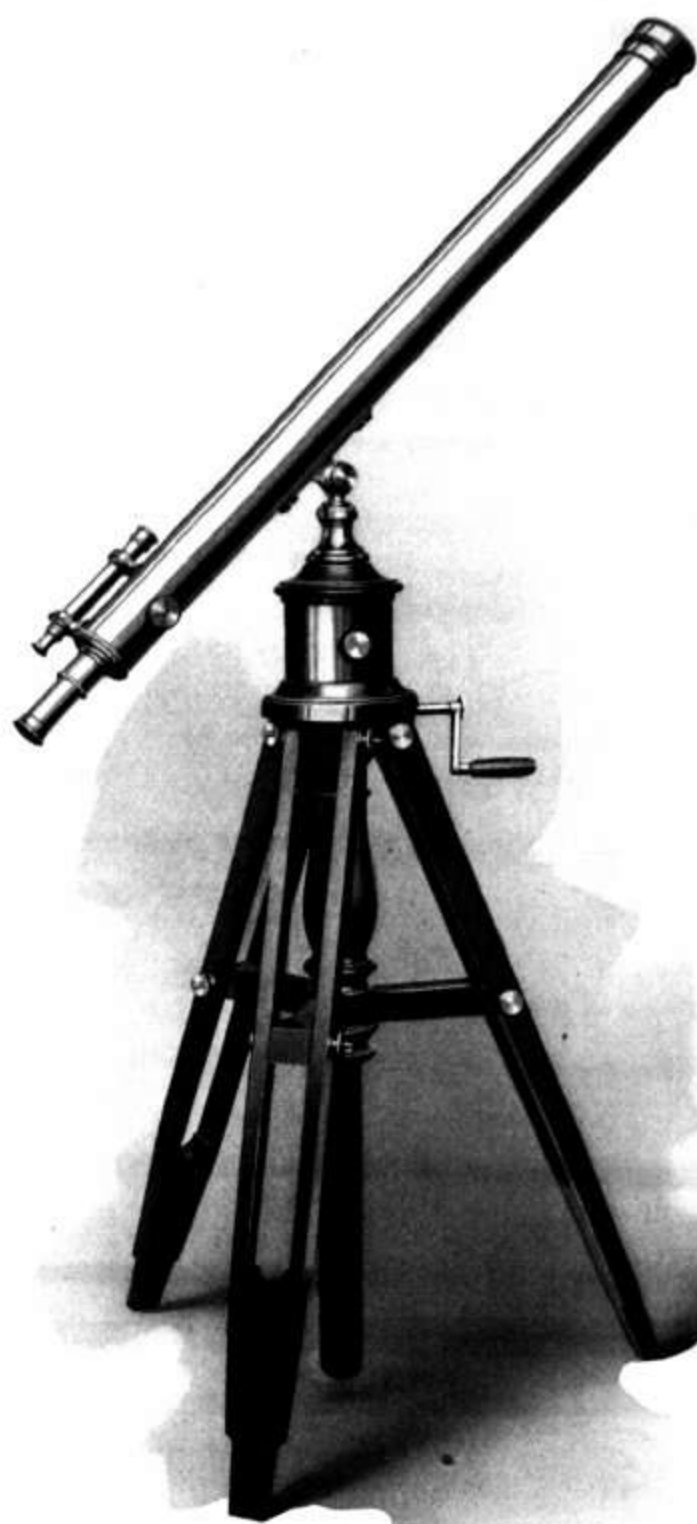
IN the Bardou Telescopes here illustrated a "finder" is provided. This is a miniature telescope attached to the tube at the eye end. It has especially large covering power and is of help in bringing objects of interest into the field of view of the larger instrument; see p. 25. Each of these telescopes is provided with a sun-glass and five eye-pieces; 2 terrestrial eye-pieces, magnifying 49 and 59 diameters, respectively; and 3 astronomical, magnifying respectively 65, 88, and 146 times. The size of object lens is  $3\frac{1}{4}$  inches. Telescope body, etc., of polished brass, with brass cap. The tripod provided is especially strong and stable, is built of mahogany, and has special cranking adjustment (see illustration) for increasing or decreasing height of instrument. Telescope in wooden box with handle, lock and key. For performance of this instrument, see par. B, p. 7. For extras, see pp. 23, 24.

## BARDOU TELESCOPE No. 5831

This instrument, with its equipment, is in all respects similar to the above except that it is somewhat larger; the diameter of the object lens is  $3\frac{1}{2}$  inches instead of  $3\frac{1}{4}$  inches, and the 5 eye-pieces have therefore somewhat larger powers. The terrestrial powers are 52 and 63; the astronomical, 70, 94, and 156. For the performance of this telescope, see par. C, p. 8. For such extras as may be desired, see pp. 23, 24.

## BARDOU TELESCOPES No. 5832, No. 5833, No. 5834

These instruments are similar in all respects to the above, except that they are larger, their object lenses have increased size, and each is provided with 6 eye-pieces instead of 5. No. 5832; Size of object lens,  $3\frac{3}{4}$  inches; two terrestrial eye-pieces, powers 55 and 66; four astronomical eye-pieces, powers 74, 99, 147, and 221. No. 5833; Size of object lens, 4 inches; two terrestrial eye-pieces, powers 57 and 69; four astronomical, powers 77, 103, 153, and 230. No. 5834; Size of object lens,  $4\frac{1}{4}$  inches; two terrestrial eye-pieces, 59 and 71; four astronomical, 79, 106, 157, and 236. For the performance of these instruments see par. D, p. 8. For extras, see pp. 23, 24.



BARDOU TELESCOPE No. 5830

(Also No. 5831, No. 5832, No. 5833, No. 5834)

These are similar in construction and design, differing only in size, price and optical equipment. Telescope No. 5830; Diameter of object lens,  $3\frac{1}{4}$  inches; length when closed, about 48 inches; extended, about 68 inches; price, \$220. Telescope No. 5831; Diameter of object lens,  $3\frac{1}{2}$  inches; length, closed, about 50 inches; extended, about 70 inches; price, \$265. No. 5832; Diameter of object lens,  $3\frac{3}{4}$  inches; length, closed, about 53 inches; extended, about 73 inches; price, \$295. No. 5833; Diameter of object lens, 4 inches; length, closed, about 56 inches; extended, about 76 inches; price, \$375. No. 5834; Diameter of object lens,  $4\frac{1}{4}$  inches; length, closed, 60 inches; extended, about 78 inches; price, \$420. For fuller particulars as to these instruments, see opposite page.

## BARDOU TELESCOPE No. 5840



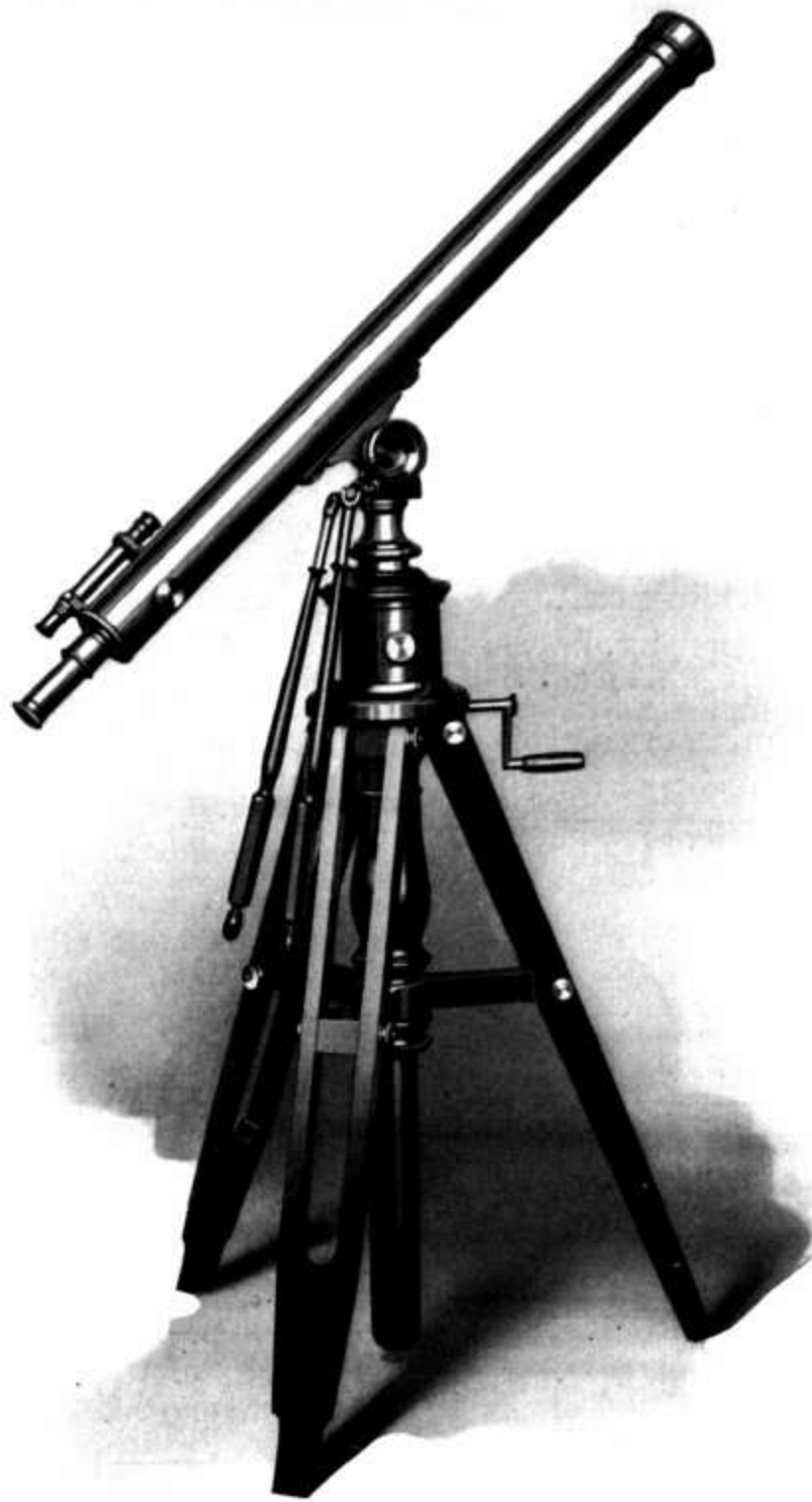
UNITING all the chief advantages of the previous models, the telescopes here illustrated are also provided with still another desirable feature. Each instrument is provided with two "slow motions," making it possible for the astronomical observer to control the telescope with greater precision and with the least possible vibration. Tangent screws engaged by rods that may be slowly turned by a very slight motion of the hand, easily enable the observer to keep the object in the field of view. Telescope No. 5840 includes a finder (for fuller description of finder, see p. 25), sun-glasses for the astronomical eye-pieces, and five eye-pieces; two terrestrial eye-pieces, powers 49 and 59; and three astronomical, powers 65, 88 and 146. The size of object lens is  $3\frac{1}{4}$  inches. Telescope body, etc., of polished brass, with brass cap to protect the object lens. The tripod provided is especially strong and stable, is built of mahogany, and, in addition to the two "slow motion" adjustments already specified has special cranking mechanism (see illustration) for increasing or decreasing height of instrument. Telescope in wooden box, with handle, lock and key. For performance of this instrument, see par. B, p. 7. For such extras as may be desired, see pp. 23, 24.

## BARDOU TELESCOPE No. 5841

This instrument with its equipment is in all respects the same as the above, except that it is somewhat larger, the diameter of the object lens is  $3\frac{1}{2}$  inches instead of  $3\frac{1}{4}$  inches, and the 5 eye-pieces have, therefore, somewhat higher powers. The powers of the 2 terrestrial eye-pieces are 52 and 63; the powers of the 3 astronomical eye-pieces are 70, 94 and 156. For the performance of this telescope, see par. C, p. 8. For extras desired, see pp. 23, 24.

## BARDOU TELESCOPES No. 5842, No. 5843, No. 5844

These instruments are the same as those described above, except that they are still larger, their object lenses have increased size and each is provided with 6 eye-pieces instead of 5. Telescope No. 5842; Size of object lens,  $3\frac{3}{4}$  inches. Two terrestrial eye-pieces, powers 55 and 66; four astronomical eye-pieces, powers 74, 99, 147, and 221. Telescope No. 5843; Size of object lens, 4 inches. Two terrestrial eye-pieces, powers 57 and 69; four astronomical eye-pieces, powers 77, 103, 153 and 230. Telescope No. 5844; Size of object lens,  $4\frac{1}{4}$  inches. Two terrestrial eye-pieces, 59 and 71; four astronomical eye-pieces, powers 79, 106, 157, and 236. For the performance of these instruments, see par. D, p. 8. For such extras as may be desired, see pp. 23, 24.



### BARDOU TELESCOPE No 5840

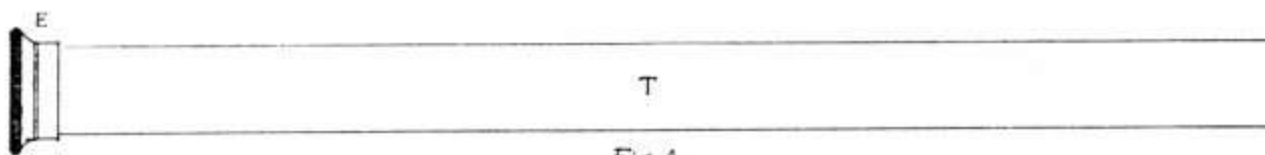
(Also No. 5841, No. 5842, No. 5843, No. 5844)

These are similar in construction and design, differing only in size, price and optical equipment. Telescope No. 5840; Diameter of object lens,  $3\frac{1}{4}$  inches; length when closed, about 48 inches; extended, about 68 inches; price, \$295. Telescope No. 5841; Diameter of object lens,  $3\frac{1}{2}$  inches; length closed, about 50 inches; extended, about 70 inches; price, \$350. Telescope No. 5842; Diameter of object lens,  $3\frac{3}{4}$  inches; length closed, about 53 inches; extended, about 73 inches; price, \$405. Telescope No. 5843; Diameter of object lens, 4 inches; length closed, about 56 inches; extended, about 76 inches; price, \$490. Telescope No. 5844; Diameter of object lens,  $4\frac{1}{4}$  inches; length, closed, 60 inches; extended, 78 inches; price, \$540. For fuller particulars as to these instruments, see opposite page.

## BARDOU EXTRAS, Etc.

We would first describe under this head not only the extras available for the Bardou Telescopes, but the uses of the two types of oculars regularly furnished with them. Each instrument, according to size, is provided with one or more terrestrial eye-pieces as well as with two or more eye-pieces for astronomical observations.

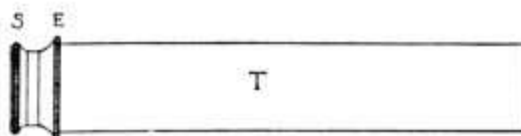
A terrestrial eye-piece, as already stated, p. 6, is for use by day. The sliding tube in which it is contained is much longer than that containing the astronomical eye-piece, for, in order to "erect" the image, or to present it to the eye right-side-up, it must contain a set of additional lenses. These should not be removed or changed except by skilled hands. In the diagrams here shown, Fig. A is the terrestrial eye-piece with its sliding tube. This is the eye-piece usually found in the instrument when the telescope is received by the purchaser.



*Fig A*



*Fig. B*



*Fig. C*

To use the astronomical eye-pieces the sliding tube T, of the terrestrial eye-piece, Fig. A, should be withdrawn from the body of the telescope and the shorter tube of the astronomical eye-piece, Fig. C, should be substituted. Sectional view of this astronomical eye-piece, with tube, is shown in Fig. B. The eye-piece itself is marked E. This screws up into T; and as each of the astronomical eye-pieces has the same thread, one can be unscrewed and withdrawn and another substituted at the pleasure of the observer. Over each of these eye-pieces, however, is screwed a small detachable sun-glass, marked S, in Fig. B and Fig. C. As this is dark in color it should be unscrewed and removed, whenever the instrument is used for night observations.

## EXTRA ASTRONOMICAL EYE-PIECES

With each Bardou Telescope there is furnished an adequate equipment of eye-pieces, both terrestrial and astronomical. These are of different powers, suited to the various instruments and especially adapted to varying conditions of light and air. Should a still wider assortment be desired, *additional* astronomical eye-pieces may be had. In ordering, give the catalog number of the telescope, as well as the power of the eye-piece wanted. The following table will show at a glance the powers available for all the Bardou Telescopes listed in this catalog.

### In Table Below

Astronomical Eye-Pieces . . . . .	Each,	\$ 5.00
Detachable Sun-Glass for above . . . . .	“	1.50
Terrestrial Eye-Pieces . . . . .	“	10.00

## POWERS OF EYE-PIECES

Available for the Telescopes of Bardou & Son

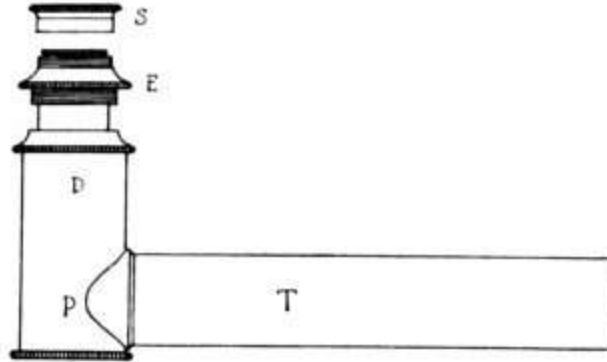
The powers indicated by black-letter numerals represent the eye-pieces *regularly* furnished without extra cost, in the optical equipment for each instrument. The telescopes are here classified, by their catalog numbers, in the column to the left.

	ASTRONOMICAL									SIZE OBJEC- TIVE	TERRESTRIAL		
5800 . . . . .	130	96	<b>86</b>	65	58	51	44	<b>37</b>	2¼ in.	47	39	<b>32</b>	
5810,5815,5820	152	114	<b>102</b>	75	68	61	50	<b>45</b>	2¾ “	55	45	<b>38</b>	
5811,5816,5821	152	<b>114</b>	102	75	68	61	<b>50</b>	45	3 “	55	<b>45</b>	38	
5826 . . . . .	180	133	<b>120</b>	90	80	72	<b>60</b>	52	3 “	65	<b>54</b>	45	
5827 . . . . .	197	146	<b>130</b>	98	88	77	<b>65</b>		3¼ “	71	<b>59</b>	49	
5830,5840 . . . . .	197	<b>146</b>	130	98	<b>88</b>	77	<b>65</b>		3¼ “	71	<b>59</b>	<b>49</b>	
5831,5841 . . . . .	210	<b>156</b>	140	104	<b>94</b>	83	<b>70</b>		3½ “	76	<b>63</b>	<b>52</b>	
5832,5842 . . . . .	270	<b>221</b>	164	<b>147</b>	110	<b>99</b>	89	<b>74</b>	3¾ “	80	<b>66</b>	<b>55</b>	
5833,5843 . . . . .	282	<b>230</b>	172	<b>153</b>	115	<b>103</b>	92	<b>77</b>	4 “	83	<b>69</b>	<b>57</b>	
5834,5844 . . . . .	290	<b>236</b>	177	<b>157</b>	119	<b>106</b>	95	<b>79</b>	4¼ “	86	<b>71</b>	<b>59</b>	



## DIAGONAL EYE-PIECES

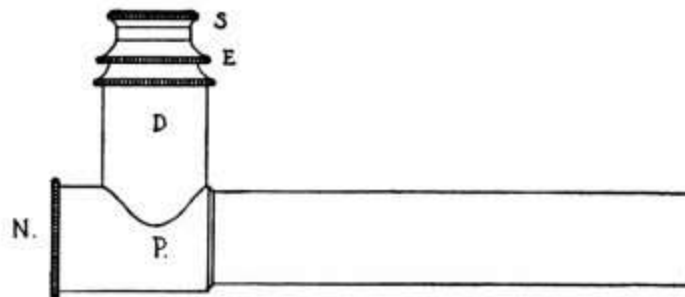
Diagonal eye-piece attachment No. 5868 ; \$18. In addition to the special oculars just mentioned, a special diagonal eye-piece may be obtained for any of the Bardou Telescopes. This is adjustable for any of the



astronomical eye-pieces. Its purpose is to add to the convenience and comfort of the observer in viewing objects near the zenith. Stars that are directly overhead thus become less difficult of observation. The rays of light coming down the tube T are deflected by a prism located in the joint at P, so that the image appears in the eye-piece, E. This eye-piece is one of the regular eye-pieces of the instrument; and, as indicated in the diagram, it may be screwed into the diagonal, or unscrewed and removed at will. Thus, even though the telescope (including the tube T) may have to point directly overhead, the observer, looking into the eye-piece at E, may survey in comfort the field above.

## THE HERSCHEL EYE-PIECE ATTACHMENT

Herschel Eye-piece Attachment No. 5869; \$20. In using the ordinary sun-glass—a cap of dark colored glass screwed on over the regular eye-pieces—it is necessary to turn the telescope from the sun at frequent intervals in order that the eye-piece may not be cracked by the heat. This dif-



iculty is largely overcome by the use of the Herschel eye-piece, into which, at E, the ordinary eye-piece may be screwed. The sun's light coming down the tube T is reflected at right angles by a plane of unsilvered glass at P.

Sufficient light passes through D to show a satisfactory image at E; but most of the heat passes freely out of the eye-piece at N. The beginner should remember to exercise due caution even with this attachment, especially in using the larger instruments,—not looking with the unprotected eye into N, but looking into D *after* the attachment of the regular eye-piece. To the regular eye-piece the small protecting sun-glass should also be attached, though this glass need not be so darkly tinted when employed with the Herschel eye-piece.

## THE FINDER

All Bardou Telescopes having objectives of  $3\frac{1}{4}$  inches and upward (except No. 5827) are provided with finders, without extra charge. A finder is a miniature telescope mounted on the main body of the instrument at the eye-piece end, so adjusted that the center of its field of view coincides precisely with the center of the field of view in the telescope proper. As the eye-piece of the finder is low in power, its field of view is especially large and well lighted. Through it, therefore, it becomes proportionately easier to find the object to which the observer is trying to direct the telescope. When located in the finder and when there brought to the center of the field, it will be found truly centered in the field of the larger instrument. Instruments without finders may be directed most easily to the object by first using the lowest power eye-piece. When the object is found, an eye-piece of higher power—if desired—may be substituted.

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## HINTS FOR THE BEGINNER

1. **Some Telescope Terms:** Telescopes are usually classified, as to size, according to the diameter of the objective,—the objective, or object glass, being the lens at the large end of the instrument. A 3-inch telescope is one possessing an objective 3 inches in diameter; a  $3\frac{1}{2}$ -inch telescope is one with objective  $3\frac{1}{2}$  inches in diameter, etc. The ocular, or the “eye-piece,” is at the smaller end of the instrument. By employing different eye-pieces the observer can in a measure vary the magnifying power of the telescope.

2. **Caring for the Instrument:** Before taking the instrument from its box be sure to note the way in which the various pieces have been packed. It will then be very easy to return the telescope to the box, in case the observer should wish to employ this as a convenient receptacle for the telescope when not in use. The metal parts may be freshened up occasionally by the careful

use of a few drops of sweet oil applied, and well wiped off, with a piece of soft chamois skin. The lenses of the instrument should not be "taken to pieces" except by skilled hands. They bear a high and brilliant polish, and the best way to keep them clean is not to let them get soiled! When cleansing is absolutely necessary use very gently, an old, soft, cambric handkerchief or a soft camel's hair brush. Do not blow the moisture of the breath on them,—this often causes the dust to stick the closer and to dry upon the surface. A few dust specks are not so serious as scratches or permanent stains upon the glass.

3. **The Use of Eye-Pieces:** The terrestrial eye-piece is contained in the longer of the brass tubes. It is for use by daylight, being of little astronomical value. It presents all its images, however, "right side up" and as the Moon usually provides abundant light for its own observation the terrestrial eye-piece is sometimes of interest in lunar study. Current charts, etc. of the Moon's surface are usually presented "up-side-down," in conformity with the image as viewed with a celestial or astronomical eye-piece. In viewing the planets, the double stars, nebulae, etc., it makes no difference to the observer if the image is reversed; he can easily make the necessary mental "correction." This permits the elimination of the additional lenses necessary for "erecting" the image, and the elimination of these lenses—inasmuch as all lenses absorb more or less light—increases the illumination of his instrument. Good seeing, in a telescope, is dependent not only on magnifying power, as is often supposed, but on the *clearness* with which the object is defined, and on its adequate lighting up, or illumination, in the field of view. The necessity for the elimination of every possible element of obscurity in the viewing of the faint objects of the night sky explains the present structure of the modern astronomical eye-piece.

4. **Viewing the Sun:** Screwed upon the astronomical eye-pieces will be found the "sun-glass," a glass of dark green or blue for the protection of the eye when viewing the sun. This dark glass should, of course, be *unscrewed* and put to one side in the use of this eye-piece at night. In viewing the sun, even with the sun-glass, the utmost caution should be observed. So great is the heat of the sun when intensified by the telescope that only an instant's flash of its rays on the unprotected eye may result in total blindness. Even when the eye is protected by the sun-glass, the telescope should be frequently turned away from the sun lest its heat crack the eye-piece of the instrument. One satisfactory way of observing the sun is to remove the sun-glass and let the image be projected and brought to focus on a piece of white sheeting or card board fixed at a distance of a few feet behind the instrument. Or, one may make use of a special solar eye-piece; see p. 24.

**5. Advantages of Low Powers:** The inexperienced observer is very naturally under the impression that the higher the magnifying power he uses, the better he can see. The practical observer soon realizes, however, that this impression is a mistake and that there are important respects in which an eye-piece of moderate power will afford more pleasure and greater true satisfaction than an eye-piece of high magnification. If it were optically possible for the lenses of the eye-piece to magnify the object *alone*, our difficulties would be less. But the magnifying power of a telescope must involve other things as well. A total magnification of 150 will magnify the object 150 times, but it will also magnify in like degree all the disturbances or impurities of the atmosphere, all the vibrations of the floor (if the instrument be placed upon the porch or veranda) and all the trembling or unsteadiness of the hand. The field of view and the brilliancy of illumination are also much smaller with a high power than with a lower, so that it is more difficult to find the star which we are seeking; and, as the motion of the earth in its revolution upon its axis is also magnified, it becomes proportionately difficult to keep the star in the field of view after it is found. The lower powers do not magnify so greatly this motion of the earth, nor the disturbances and impurities of the atmosphere. Indeed it is often possible to work with considerable satisfaction with low powers under atmospheric conditions which make the employment of high powers impossible. The unsteadiness of the hand in directing the instrument becomes less annoying, the field of view being larger it is far easier to find the star, and as the illumination is strikingly greater, the object, whether star or planet or nebula, is better lighted. This factor of adequate *light* in the field of view is of fundamental importance, especially to the beginner. High power eye-pieces have their place. They are furnished with each instrument; and still higher powers may be obtained as extras; but practical astronomers now unite in advising the observer to resist the common tendency to use eye-pieces of excessive magnification. Such a tendency—especially in the earlier stages of experience—is sure to lead to disappointment.

**6. The Limitations of the Telescope:** Many purchasers of a telescope begin their experiments with undue anticipations; and even when the instrument fully meets the legitimate tests to which it is subjected, they are not at once prepared to understand its excellence. The writer has frequently heard the novice declare when using a power of 50 on the Moon, that the image presented was *not* fifty times the size of the image presented to the unaided eye! This misconception is largely due to the fact that there is nothing within the picture presented in the telescope, with which the object can be compared. When, however, the objector is requested to view the telescopic Moon with one eye while keeping the other eye open and fixed upon the Moon outside the telescope, the injustice of the criticism of the

instrument has at once been manifest. And yet every telescope, whether large or small, has its limits. The beginner may keep himself in a state of restless discontent by ceaselessly spending time and energy on extremely difficult objects just at the limit of invisibility; or he may approach the study of such objects gradually and intelligently through his careful appreciation of the many interesting things that fall easily within the normal capacity of his telescope. It is useless, moreover, to contend against bad atmospheric conditions such as fog and mist, or to expect an instrument to work properly if subjected to unsteadiness in its mounting or to gusts of wind. "There are some things," says Kelvin McKready, "that are as impossible to a good optical instrument as for a fine watch to tick seventy-five seconds to the minute." The very power by which it magnifies makes it exaggerate anything unfortunate in the conditions which attend its work. Look, therefore, to the steadiness of the tripod, to its protection from winds and vibration; and expect the *best* results only through a clear atmosphere.

7. **Using the Telescope:** The dark tinted sun-glass will be found attached to the astronomical eye-pieces as already stated. It should, of course, be unscrewed and removed whenever the eye-piece is used for the stars, Moon, etc. Spread the legs of the tripod evenly, so that the instrument will be properly centered: everything that contributes to the steadiness of the telescope will help toward satisfaction and pleasure in its use. Most observers work far better while seated. Use a plain steady stool or ordinary straight-back chair. In pointing the instrument a finder (See p. 25) is sometimes helpful; on instruments with object-lens of  $3\frac{1}{4}$  to  $3\frac{1}{2}$  a finder is desirable; on  $3\frac{3}{4}$  and 4 inch, one is almost indispensable,— especially if the observer wishes to work with magnifications of over 125 diameters. With instruments having no finder, first use the lowest power astronomical eye-piece for finding the object, bringing the object to center of the field of view; then substitute, if you wish, the eye-piece of higher power. Refocusing will be necessary, but with a little practice you will easily overcome the slight difficulties involved.

8. **Focusing a Telescope:** To learn to focus a telescope quickly, practice at first by daylight. Take the terrestrial eye-piece, contained in longer tube, and push tube into the instrument till objects at two or three hundred yards begin to look clear—then make a mark on the tube with a lead pencil to indicate in a rough way the *approximate* focus; then secure the exact focus for the particular distance in each case by turning the screw of the rack and pinion adjustment, moving the eye-piece a little further in or out as the case may be. Follow the same method with shorter tube holding the astronomical eye-pieces, using lowest magnification. Get *first*—not by using rack and pinion, but by sliding the tube in or out—an approximate focus for

greatest distance at your command by daylight, make mark on side of tube with pencil. At night insert the tube as far as indicated by this mark, then secure exact focus on a bright star, now running the tube a little further in by turning the side screw controlling the rack and pinion adjustment. After finding this exact point, mark it on the brass surface of the tube by a slight but sharp scratch of a knife or wire nail. You can then feel this line at night without use of candle or lantern. It will not represent the absolute focus for every object or for every eye, but its presence will simplify the operation,—for the absolute focus will not be far away. A star is “in focus,” not when it looks largest but when its image is sharpest, smallest and brightest. The distances of the fixed stars are so great that no telescope, however large, will reveal a disc or “surface area,” though they may be often seen as doubles or triples showing beautiful and contrasted colors. The planets, however, show an appreciable disc, and our Moon, of course, shows many interesting details of its topography. (See paragraphs A. B., etc., p. 7.)

9. **A Useful Book:** The beginner will wish to know how and when and where to find the objects of telescopic interest. Many of the star-maps in current circulation are too elementary or too complicated. Even the text-books on astronomy are sometimes overloaded with mathematical or technical details. There is now in press, however, a volume especially adapted to the practical needs of those who wish a well illustrated and clearly written handbook,—accurate in its scientific information and yet popular enough to meet the wishes of the average man or woman. It is entitled, “A BEGINNER’S STAR-BOOK: With Charts of the Moon, Star-Maps on a new Plan, and an Easy Guide to the Astronomical Uses of the Opera Glass, the Field Glass, and the Telescope.” The author is Kelvin McKready, the well-known writer on astronomical subjects, and the publishers are G. P. Putnam’s Sons, of New York and London.

## QUICK REFERENCE INDEX

CATALOG NUMBER	SIZE OF OBJECTIVE			EYE-PIECE EQUIPMENT	RETAIL PRICE	DESCRIPTION ON PAGES
5800	2¼ in.			1 Ter., 2 Ast.	\$ 65.00	10, 11
5810	2¾ "			1 " 2 "	72.00	10, 11
5811	3 "			1 " 2 "	80.00	10, 11
5815	2¾ "			1 " 2 "	75.00	12, 13
5816	3 "			1 " 2 "	85.00	12, 13
5820	2¾ "			1 " 2 "	85.00	14, 15
5821	3 "			1 " 2 "	95.00	14, 15
5826	3 "			1 " 2 "	150.00	16, 17
5827	3¼ "			1 " 2 "	195.00	16, 17
5830	3¼ "	Finder		2 " 3 "	220.00	18, 19
5831	3½ "	Finder		2 " 3 "	265.00	18, 19
5832	3¾ "	Finder		2 " 4 "	295.00	18, 19
5833	4 "	Finder		2 " 4 "	375.00	18, 19
5834	4¼ "	Finder		2 " 4 "	420.00	18, 19
5840	3¼ "	Finder	2 Slow Motions	2 " 3 "	295.00	20, 21
5841	3½ "	Finder	2 Slow Motions	2 " 3 "	350.00	20, 21
5842	3¾ "	Finder	2 Slow Motions	2 " 4 "	405.00	20, 21
5843	4 "	Finder	2 Slow Motions	2 " 4 "	490.00	20, 21
5844	4¼ "	Finder	2 Slow Motions	2 " 4 "	540.00	20, 21
Extra Ast. Eye-piece	Any Power on p. 23				5.00	23
Sun-glass for Above					1.50	
Extra Ter. Eye-piece	Any Power on p. 23				10.00	23
5868	Diagonal Eye-piece				18.00	24
5869	Herschel Attachment				20.00	24