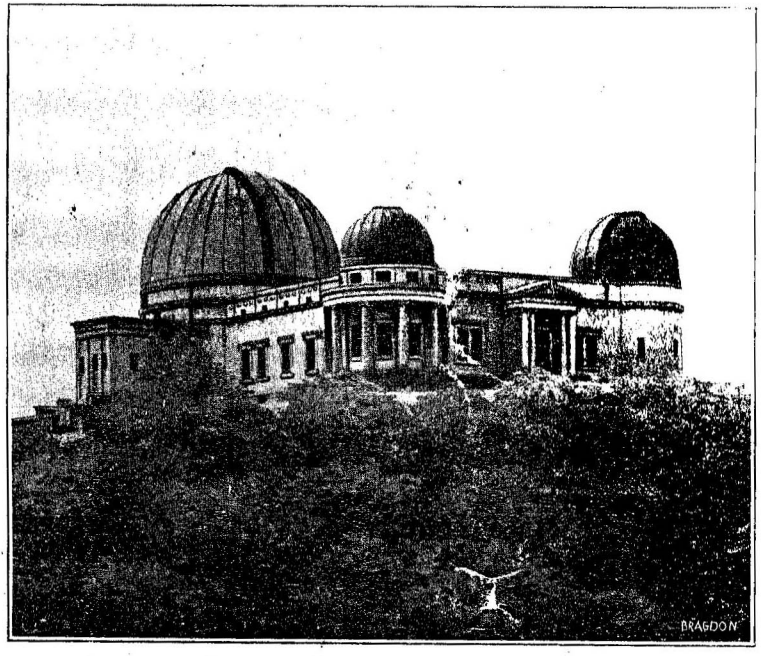


The New Allegheny Observatory

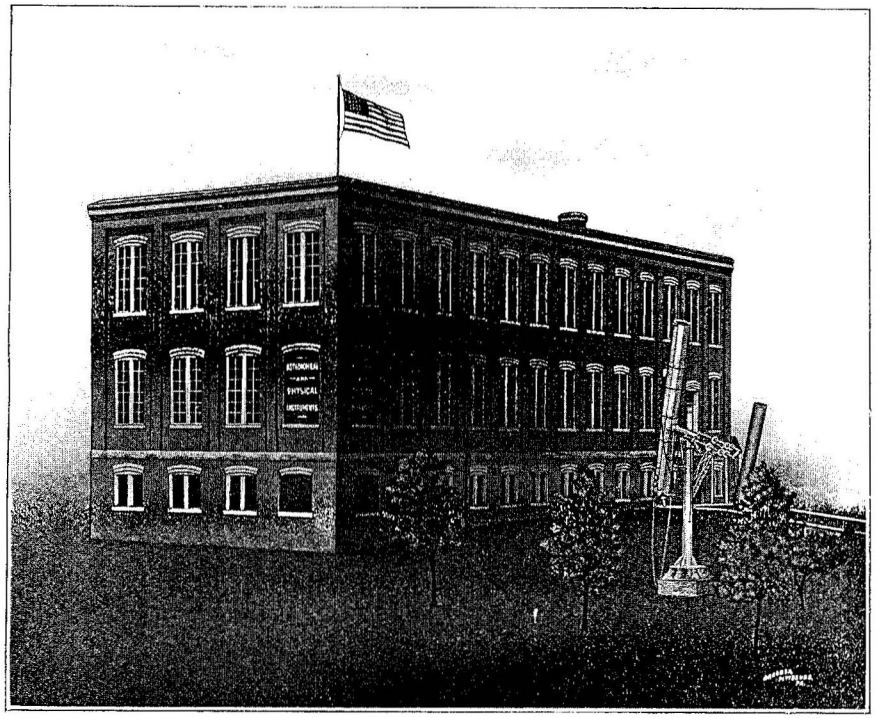
CATALOGUE

Optical, Physical, Astrophysical and Astronomical Instruments

. . . 1906 . . .

JOHN A. BRASHEAR COMPANY, LTD.

ALLEGHENY, PENNA., U. S. A.



Works of the John A. Brashear Co., Ltd.

CATALOGUE

OPTICAL, PHYSICAL, ASTROPHYSICAL

—AND—

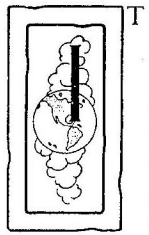
ASTRONOMICAL INSTRUMENTS

...1906...

JOHN A. BRASHEAR CO., LTD.

ALLEGHENY, PENNA., U. S. A.

INTRODUCTION



IT is a very difficult, indeed, an almost impossible task, to publish a comprehensive Catalogue of the various types of Optical, Physical, Astrophysical and Astronomical Instruments made by us. ∴ For nearly thirty years we have been engaged almost wholly in constructing instruments of precision for original research, and our work is so well known throughout the scientific world that a complete descriptive Catalogue is fortunately not required. ∴ Beside this, almost every physicist and astronomer desires to engage in some line of research requiring a special adaptation of the instrument he proposes to use, so that what is illustrated today may not be suitable for the work of tomorrow; and it is only by correspondence or a personal visit to our works that exact data can be determined upon. ∴ It is the aim of our firm to produce high grade apparatus, especially in optical lines. We have associated with us Dr. Chas. S. Hastings, of the Sheffield Scientific School of Yale University, who computes all visual, spectroscopic and photographic lenses, and we are thus enabled to give the very best results obtainable. ∴ For many years we have also had most pleasant business relations with the Warner & Swasey Company, Cleveland, Ohio, whose work in the construction of the larger astronomical instruments is so well known among astronomers, and through this firm we are enabled to contract for the largest telescopes required. ∴ The illustrations in this Catalogue are from photographs of instruments made by us and in actual use. The prices given are for standard instruments and apparatus. In some cases, however, it is impossible to give the cost of an instrument until the desires of the purchaser are known; therefore we cordially invite correspondence, and should any of our patrons desire to make us a personal visit, they will be made welcome. ∴ ∴ ∴

Price List of Achromatic Objectives for Telescopes, Spectroscopes, Etc.

2	inches	clear aperture, in cell		$ 20
2.5	"	"	"	30
3	"	"	"	50
3.5	"	"	"	70
4	"	"	"	100
4.5	"	"	"	125
5	"	"	"	175
5.5	"	"	"	225
6	"	"	"	325
6.5	"	"	"	400
7	"	"	"	500
7.5	"	"	"	600
8	"	"	"	700
8.5	"	"	"	800
9	"	"	"	900
9.5	"	"	"	1,000
10	"	"	"	1,125
11	"	"	"	1,500
12	"	"	"	2,000
13	"	"	"	2,575
14	"	"	"	3,200
15	"	"	"	3,800
16	"	"	"	4,800
18	"	"	"	6,900
20	"	"	"	9,400
22	"	"	"	11,500
24	"	"	"	14,000
26	"	"	"	18,000
30	"	"	"	25,000
36	"	"	"	40,000

Special Objectives

Objectives made for flattening the spectrum at any wave length. Amplifying lenses, double, triple and quadruple lenses corrected for any part of the spectrum. Astronomical Camera Doublets with wide field—double the price of Standard Objectives quoted above. Standard Objectives up to 6 inch aperture usually kept in stock.

Price List of Plane Mirrors for Coelostats, Siderostats, Etc.

These Mirrors are corrected to one-fifth sodium light wave, and are free from zonal errors.

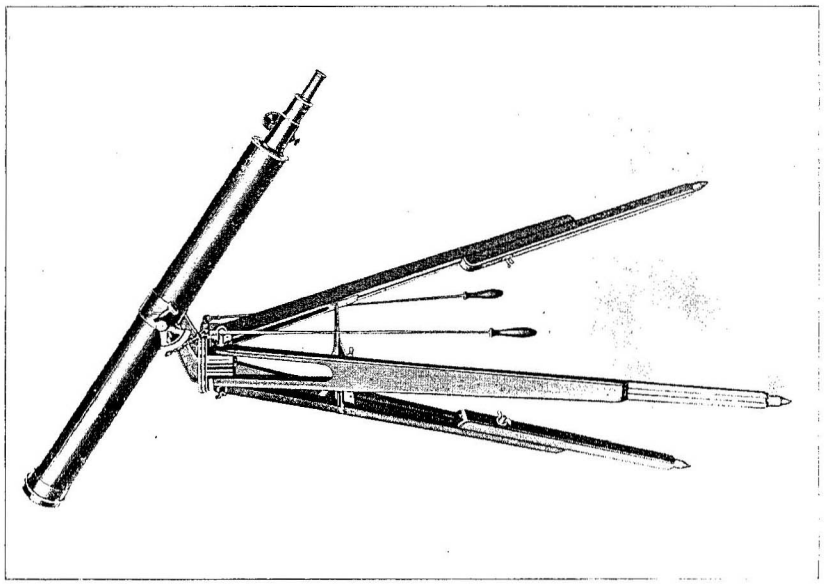
Plane Mirror	5	inches diameter		$ 35
"	6	"		45
"	7	"		60
"	8	"		90
"	9	"		125
"	10	"		175
"	12	"		300
"	15	"		650
"	18	"		950
"	20	"		1,350
"	24	"		2,000
"	30	"		3,000
"	36	"		4,500

Price List of Specula and Plane Mirrors for Newtonian Silvered Glass Reflecting Telescopes

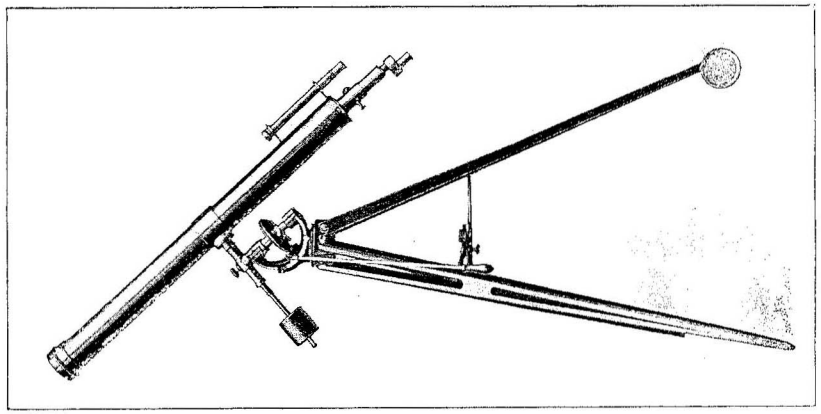
5	inches	diameter,	4	feet	focus, $	30,	Diagonal Plane, $	8.00
6	"	"	5	"	"	40,	" "	8.50
7	"	"	6	"	"	55,	" "	9.25
8	"	"	6	"	3 in. "	80,	" "	10.00
9	"	"	6	"	6 " "	100,	" "	12.00
10	"	"	7	"	"	150,	" "	14.50
11	"	"	7	"	6 in. "	200,	" "	18.00
12	"	"	8	"	"	250,	" "	25.00
15	"	"	10	"	"	375,	" "	40.00
18	"	"	11	"	"	650,	" "	65.00
20	"	"	12	"	"	1,000,	" "	100.00
24	"	"	15	"	"	1,600,	" "	175.00
30	"	"	17	"	"	2,800,	" "	300.00

We also make Mirrors for the Cassegrain form of reflecting telescope, which are especially adapted to spectroscopic studies.

Prices quoted for larger Mirrors up to 7 feet diameter.



Alt-Azimuth Refracting Telescope.
Mounted on strong tripod. See pages 8 and 9.



Equatorial Refracting Telescope.
Mounted on strong tripod. See pages 8 and 9.

Price List of Small Refracting Telescopes

Alt-Azimuth Mounting on Strong Tripod

	Without slow motions.	With one slow motion.	With two slow motions.
2.5-inch	$100	$120	$140
3 "	125	145	165
3.5 "	160	180	200
4 "	225	250	275
4.5 "	275	300	325

Three Celestial Eyepieces furnished with 2.5 inch and 3.5 inch.

Four " " " " 4 " " 4.5 "

Finder supplied with 4 inch and 4.5 inch.

Diagnonal $15 extra.

Terrestrial Eyepiece (4-lens type) $10 extra.

Prism Terrestrial Eyepiece, to use any of the Celestial Eyepieces furnished with telescope, $35 extra.

Equatorial Mounting on Strong Tripod

3 -inch	Without Circles or Clock,	$185
3.5 "	" " "	225
4 "	" " "	300
4.5 "	" " "	325

Circles and driving clock not recommended for tripod mountings.

Finder not included in cost of 3 and 3.5-inch.

4-inch and 4.5-inch have finders.

Tripod Equatorials have slow motion in right ascension by tangent screw.

Three Celestial Eyepieces furnished with 3 and 3.5-inch.

Four " " " " 4 " 4.5 "

Diagonal $15 extra.

Terrestrial Eyepiece (4-lens type) $10 extra.

Prism Terrestrial Eyepiece, to use any of the Celestial eyepieces furnished with telescope, $35 extra.

Price List of Telescopes Mounted on Tripod or Iron Column, from 5 to 6 inches aperture

Equatorials without circles and driving clock

	Mounted on tripod.	Mounted on plain iron column.
5 -inch,	$500	$600
5.5 "	575	675
6 "	700	825

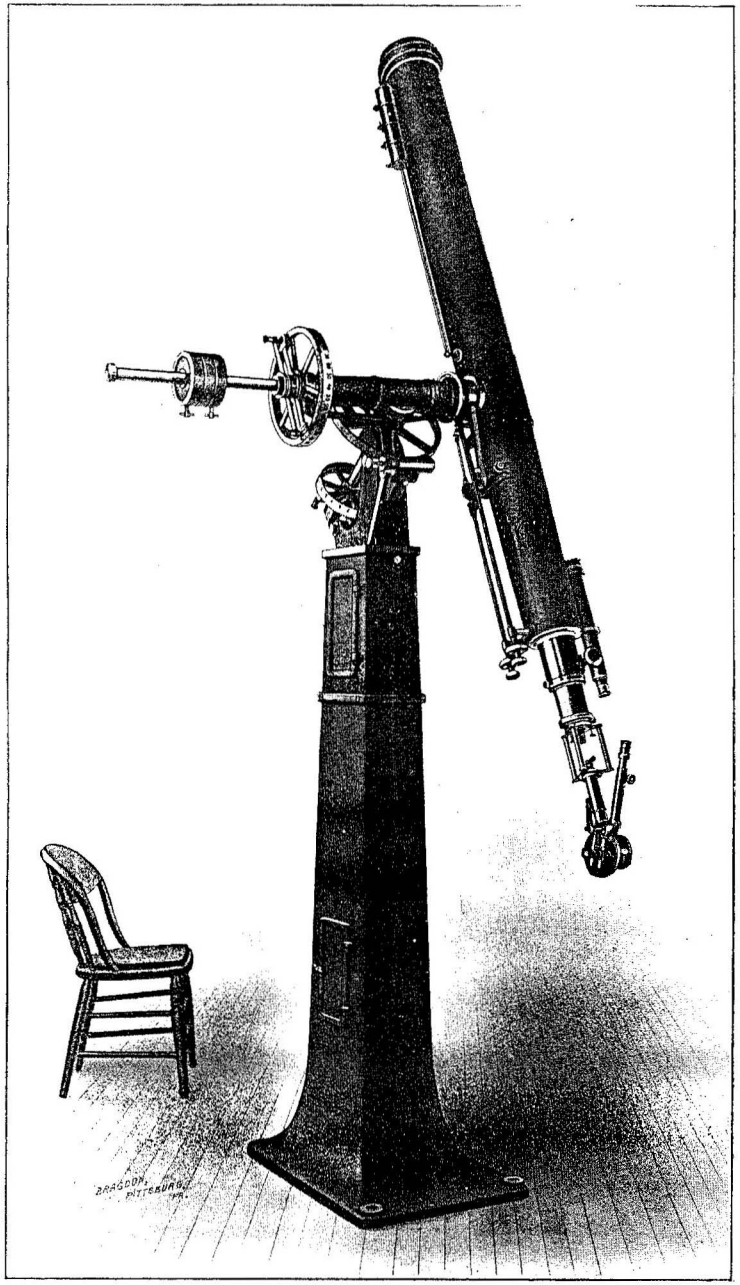
Alt-Azimuth mounting on tripod

	Without slow motion.	With one slow motion.	With two slow motions.
5 -inch,	$425	$450	$475
5.5 "	500	525	550
6 "	600	635	670

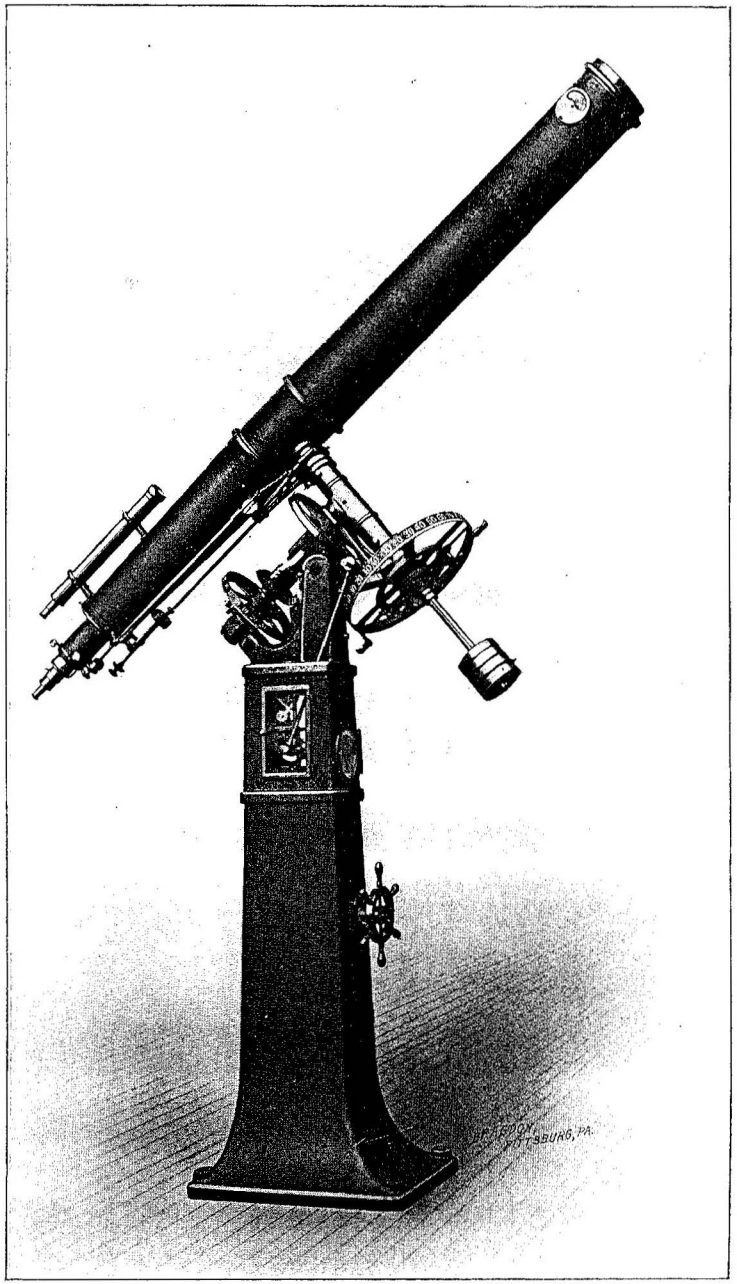
Telescopes mounted on tripod too heavy to handle if over 6-inches diameter of objective.

Circles and driving clock not recommended for telescopes mounted on tripod.

Above instruments furnished with finder, four eye-pieces, diagonal prism and dark sun cap. Herschel prism and polarizing helioscopes for solar observations, extra.



Standard Six-Inch Equatorial Telescope,
Showing small spectroscope attached. See page 12.



Standard 10 and 12-Inch Equatorial Telescope.
See page 14.

Price List of Equatorial Telescopes

(Highest Class)

4-Inch Equatorial Telescope

4-inch equatorial mounting on iron column, complete with R. A. and declination clamps and slow motions	$ 200
4-inch objective in cell	100
Five eye-pieces, one for finder, at $5 each	25
1.5-inch finder objective in cell	10
Diagonal prism	15
	$ 350

EXTRAS

Right ascension and declination circles	$ 60
Driving clock	150
Photographic lens	60

6-Inch Equatorial Telescope

6-inch equatorial mounting, including driving clock, coarse and fine circles, R. A. and declination clamps and slow motions at eye end	$1,200
6-inch objective in cell	325
2-inch finder objective in cell	20
Five eye-pieces, one for finder, at $5 each	25
Diagonal prism	20
	$1,590

EXTRAS

Filar micrometer	$200
Four positive eye-pieces for same at $5 each	20
Helioscope	50
Herschel prism	35

Price List of Equatorial Telescopes

(Continued)

8-Inch Equatorial Telescope

8-inch equatorial mounting, including driving clock, coarse and fine circles, R. A. and declination clamps and slow motion at eye end	$2,300
8-inch objective in cell	700
2.5-inch finder objective in cell	30
Six eye-pieces, one for finder, at $5 each	30
Diagonal prism	20
Wide field eye-piece	20
Sidereal dial, R. A. circle and R. A. quick motion on north side of pier	300
	$3,400

EXTRAS

(For 8-inch equatorial)

Filar micrometer	$350
Four positive eye-pieces for same at $5 each	20
Helioscope	50
Herschel prism	35

9-Inch Equatorial Telescope

9-inch equatorial mounting, driving clock, coarse and fine circles, R. A. and declination clamps and slow motion at eye end	$2,500
Object glass	900
2.5-inch finder objective in cell	30
Six negative eye-pieces, one for finder, at $5 each	30
Diagonal prism	20
Low power eyepiece	20
Sidereal dial, R. A. circle and R. A. quick motion at north side of column	300
	$3,800

Extras same price as for the 8-inch equatorial.

Price List of Equatorial Telescopes

(Continued)

10-Inch Equatorial Telescope

10-inch equatorial mounting, including driving clock, coarse and fine circles, R. A. and declination clamps and slow motion at eye end	$3,000
10-inch objective in cell	1,125
3-inch finder objective in cell	50
Six eye-pieces, one for finder, at $5 each	30
One diagonal prism	20
One wide field eye-piece	20
Sidereal dial, R. A. circle and R. A. quick motion on north side of column	400
	$4,645

EXTRAS

Filar micrometer	$450
Four positive eye-pieces for same at $5 each	20
Helioscope	50
Herschel prism	35

12-Inch Equatorial Telescope

12-inch equatorial mounting, including same parts as the 10 inch,	$ 3,400
12-inch objective in cell	2,000
3-inch finder objective in cell	50
Six eye-pieces, one for finder, at $5 each	30
One diagonal prism	20
One wide field eye-piece	20
Sidereal dial, R. A. circle and R. A. quick motion on north side of column	400
	$5,920

EXTRAS

Filar micrometer	$450
Five positive eye-pieces for same at $5 each	25

Price List of Equatorial Telescopes

(Continued

15-Inch Equatorial Telescope

15-inch equatorial mounting, including driving clock, coarse and fine circles, R. A. and declination clamps and slow motion at eye end	$ 6,000
15-inch objective in cell	3,800
4-inch finder objective in cell	100
Six negative eye-pieces, one for finder, at $5 each	30
Diagonal prism	20
Low power wide field eye-piece	25
Sidereal dial, R. A. circle and R. A. quick motion on north side of column	600
	$10,575

EXTRAS

Filar micrometer	$600
Six positive eye-pieces for same at $5 each	30
Helioscope	50
Herschel prism	35

18-Inch Equatorial Telescope

18-inch equatorial mounting, including driving clock, coarse and fine circles, R. A. and declination clamps and slow motion at eye end	$ 7,100
18-inch objective in cell	6,900
4-inch finder objective in cell	100
Six negative eye-pieces at $5 each	30
Diagonal prism	20
Low power wide field eyepiece	25
Sidereal dial, R. A. circle and R. A. quick motion at north side of column	1,000
	$15,175

Price List of Equatorial Telescopes

(Continued)

EXTRAS

For 18-inch telescope

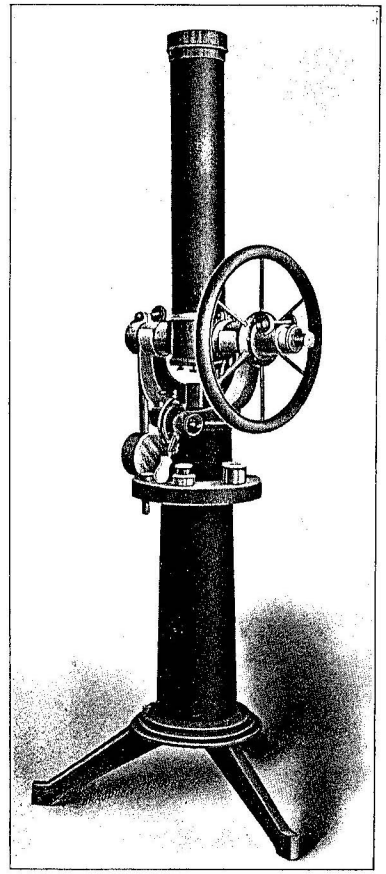
Filar micrometer	$600
Six positive eyepieces at $5 each	30
Helioscope	50
Herschel prism	35

We will be pleased to furnish estimates on larger sizes up to 40 inches.

20" Mounting $11.500

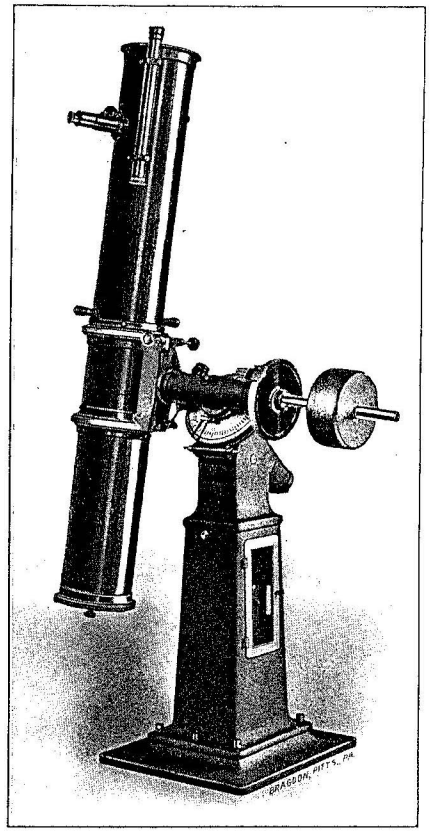
20" Objective + 4" Finder
eyepieces Etc 9.570

$21.070

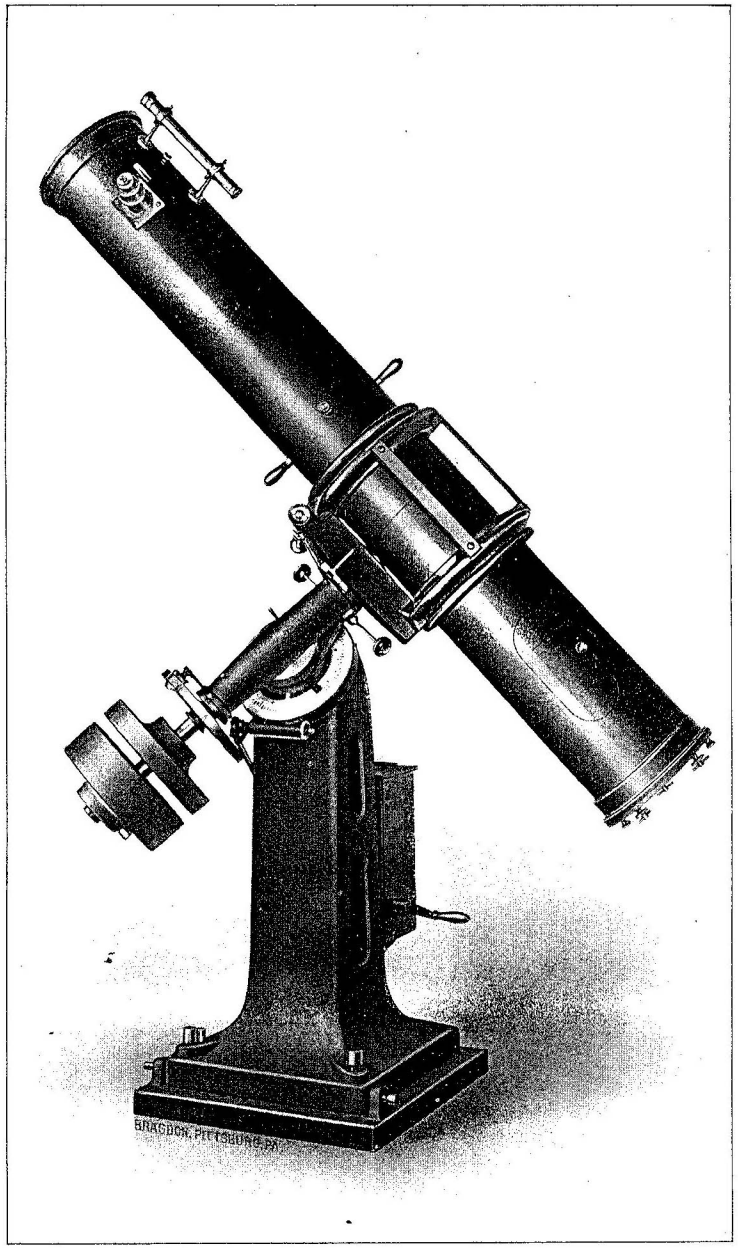


Comet Seeker,

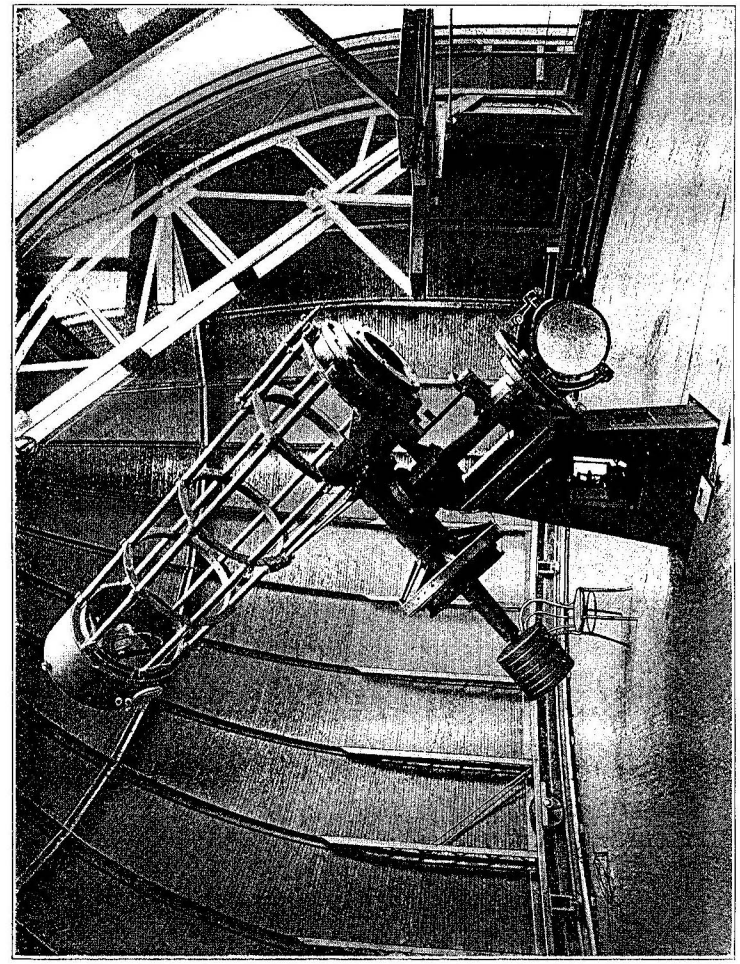
with right angle prism to direct the rays through the axis, at one extremity of which is placed the eye piece. The field swept over can be regulated by lever and ratchet shown in cut. Sizes from 4 to 6 aperture.



Six-Inch Standard Equatorial Reflecting Telescope, with driving clock and circles, rotating tube and slow motions. See page 20.



Standard Equatorial Reflecting Telescope,
with circles and driving clock. See page 20.



30-Inch Reflecting Telescope.
May be used either as a Cassegrain or Newtonian. See page 20.

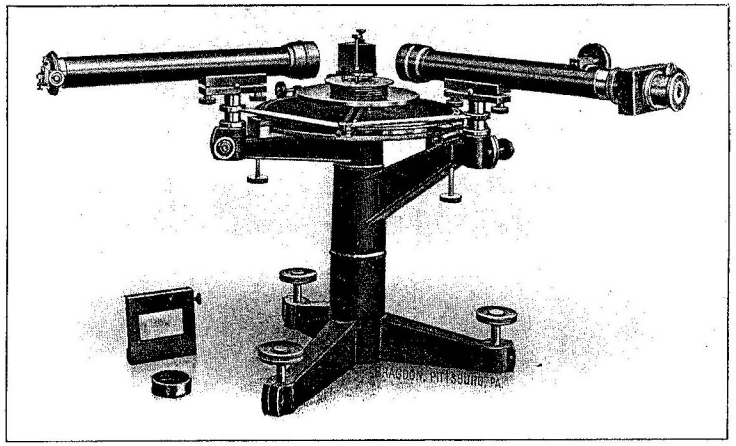
Silvered Glass Reflecting Telescopes
Without circles or driving clock . . .

5	inches	aperture,	4	feet	or	more	focus..... $ 225
6	"	"	5	"	"	"	 300
7	"	"	5	"	"	"	 375
8	"	"	6	"	"	"	 500
9	"	"	6	"	"	"	 625
10	"	"	7	"	"	"	 775
11	"	"	7	"	"	"	 925
12	"	"	8	"	"	"	 1,100
15	"	"	10	"	"	"	 1,750

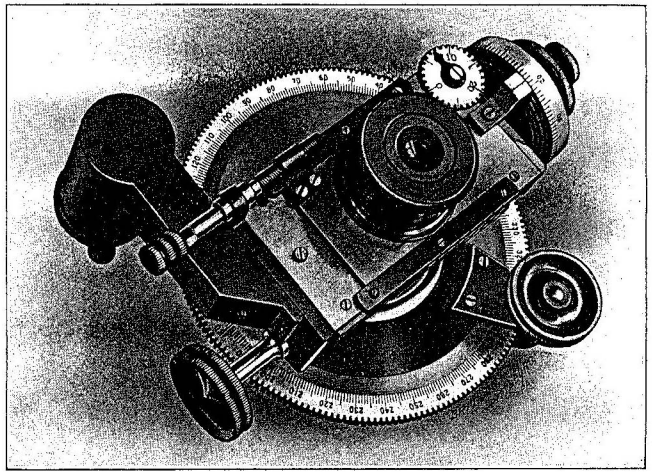
Silvered Glass Reflecting Telescopes
With circles and driving clock . . .

5	inches	aperture	$ 575
6	"	"	650
7	"	"	775
8	"	"	900
9	"	"	1,075
10	"	"	1,300
11	"	"	1,650
12	"	"	1,850
15	"	"	2,550
18	"	"	3,000
20	"	"	4,000
24	"	"	5,500
30	"	"	7,500

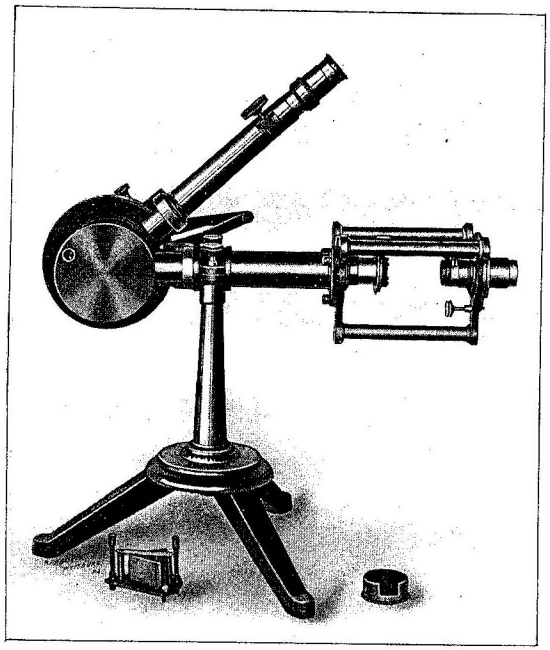
Prices given on application for larger sizes. We can furnish plane, spherical or parabolic mirrors up to 84 inches diameter.



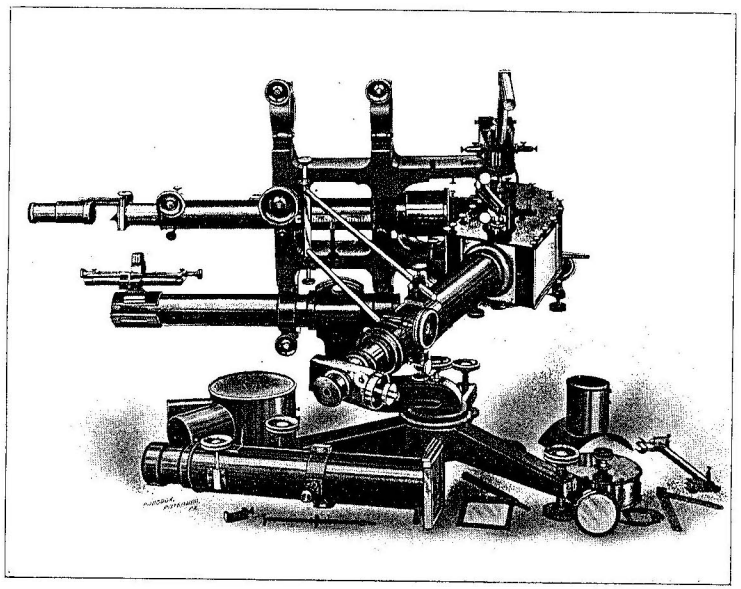
Standard Laboratory Spectroscope.
This is a very heavy instrument, with circle, light and dense prisms, grating and all accessories.
Price from $150 to $500.



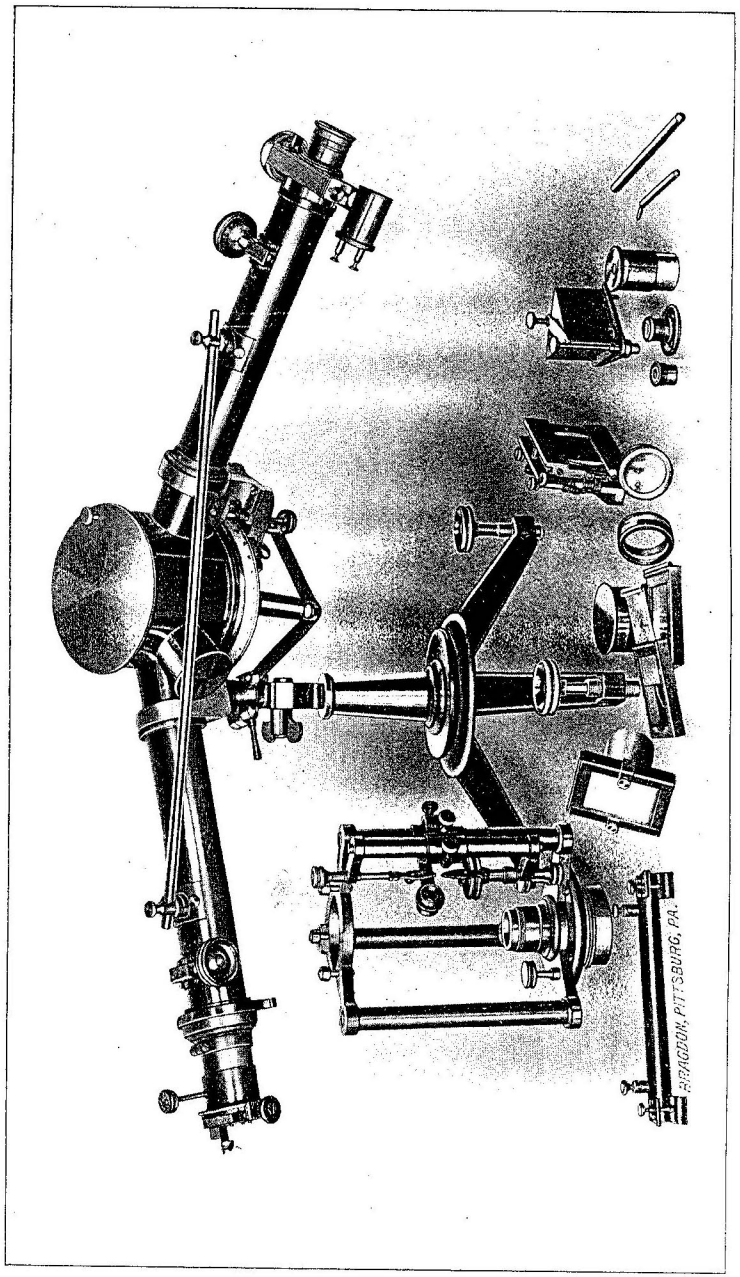
Parallel Wire Position Micrometer.
Electric illumination. Price from $175 to $500. The illustration shows one of our $175 instruments.



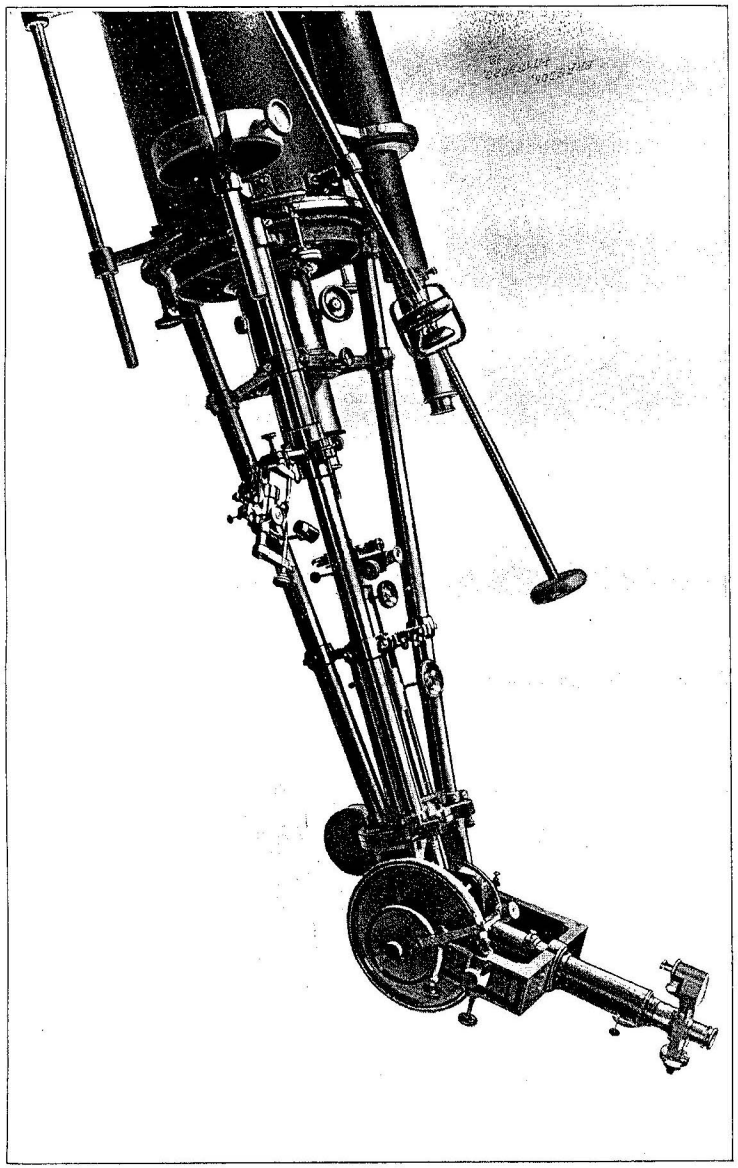
Medium Standard Spectroscope. See page 30.



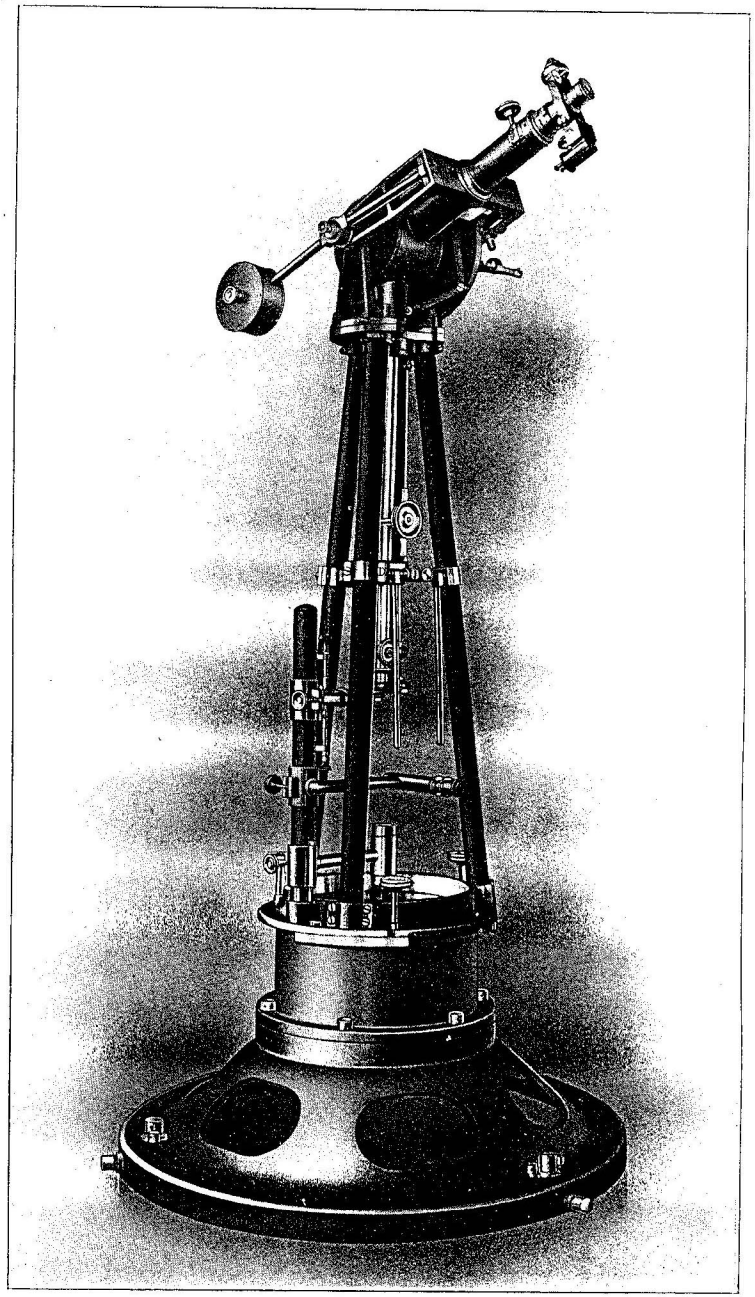
Standard Spectroscope and Spectrograph.
Made for the Flower, Emerson McMillan, Philadelphia, Ottawa and other Observatories.
See page 30.



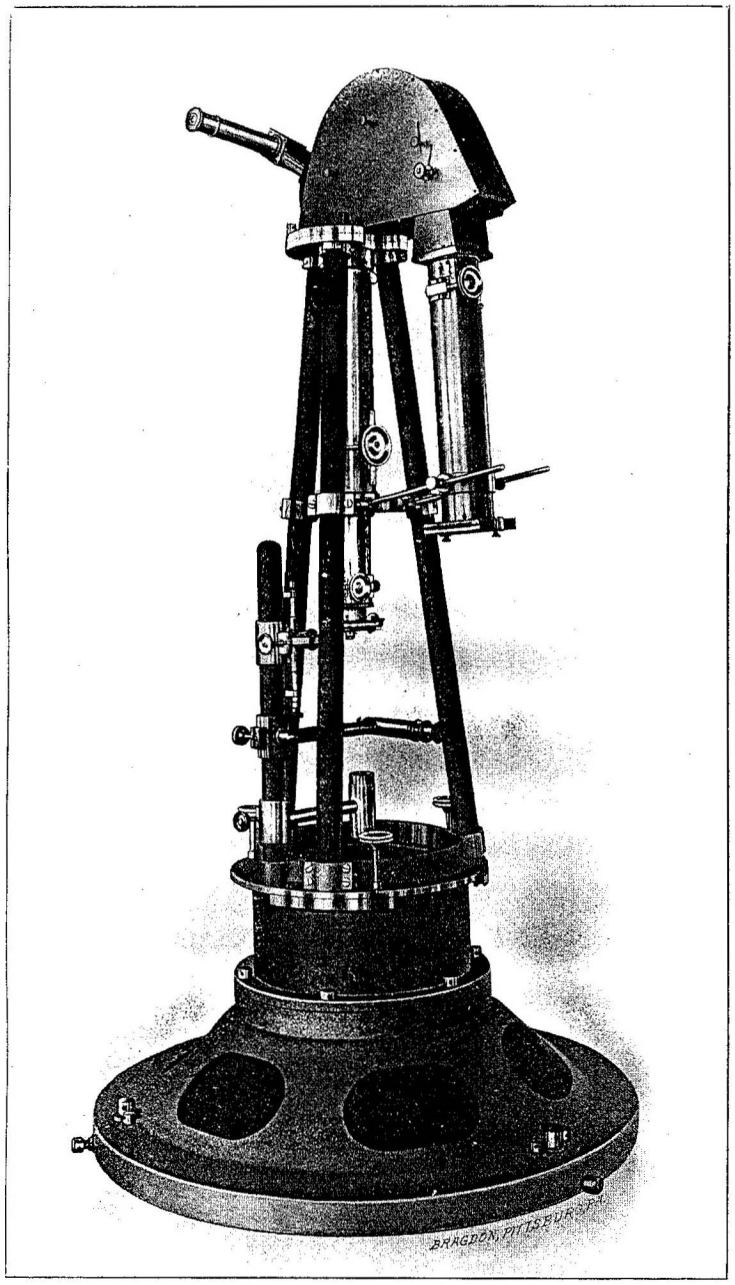
Medium Standard Spectroscope,
with all accessories for astronomical spectroscopy, visual and photographic. Comparison apparatus for metals and gases. See page 30.



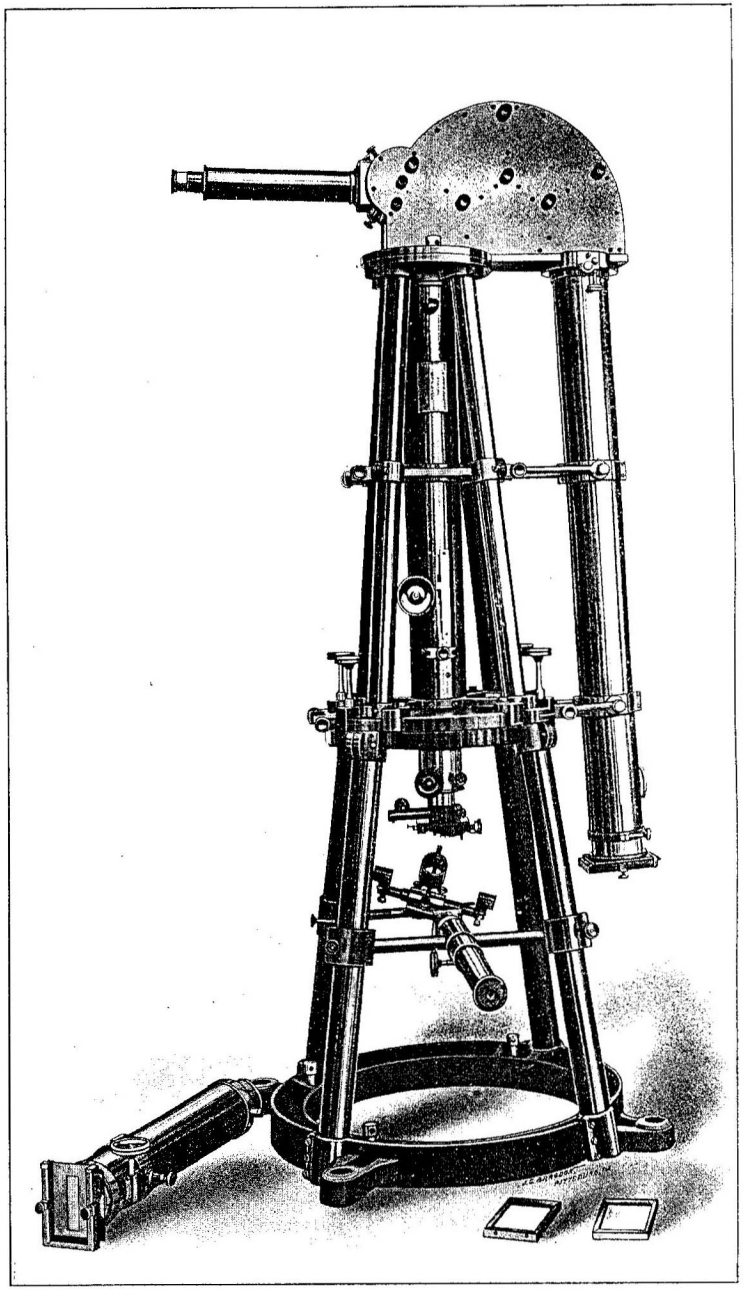
Spectroscope and Spectrograph.
Made for Allegheny, Yerkes and United States Naval Observatories.
Engraving shows adaptation for one prism.
See page 30.



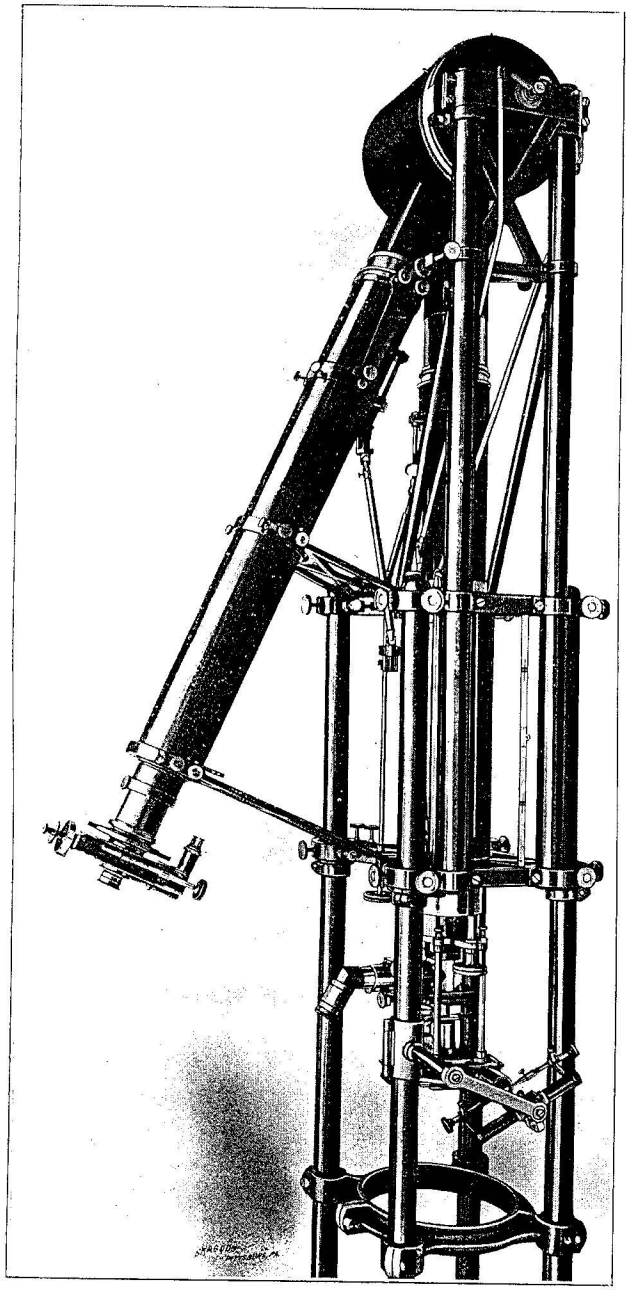
Highest Grade Spectroscope and Spectrograph.
Engraving shows arrangement for visual work. Made for Lowell Observatory.
See page 30.



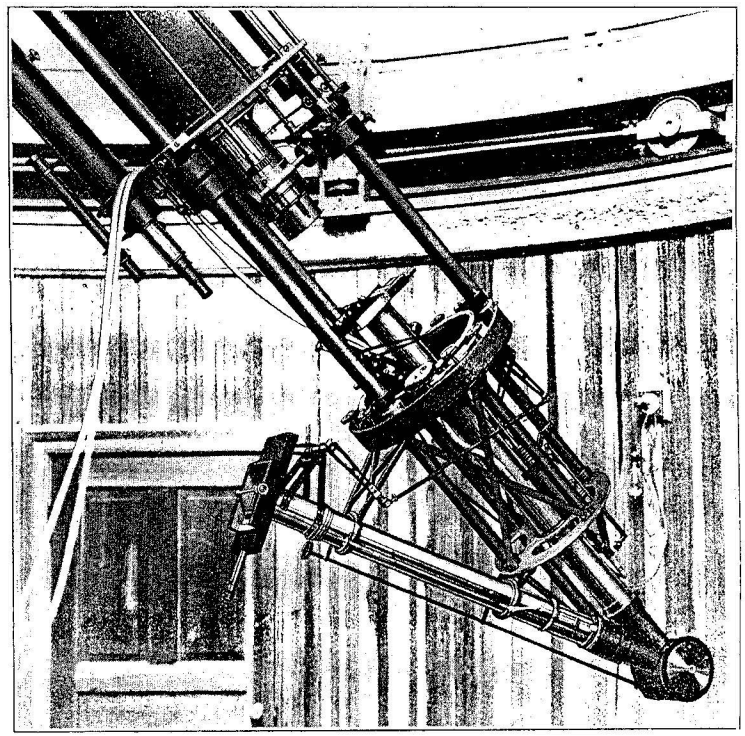
Highest Grade Spectroscope and Spectrograph.
Engraving shows arrangement for photography. Made for Lowell observatory.
See page 30.



The Mills Spectrograph.
Made for Lick Observatory. See page 30.



The Princeton Spectroscope.
Made for Prof. C. A. Young, Director Halstead Observatory.
See page 30.



The Kenwood Observatory Spectroheliograph.
Made for Prof. Geo. E. Hale. Other forms of this instrument made to order.
Prices given on application.

Spectroscopes — With plane grating and prisms for astrophysical studies

Smallest size for telescopes, 3 to 6-inch aperture, visual only, with one prism and small grating..... $ 100

Medium size for telescopes, 4 to 8-inch aperture, visual only, two single prisms and small grating..... 210

Medium standard for telescopes, 6 to 12-inch aperture, visual only, two single prisms and small grating..... 415

Medium standard for telescopes, 6 to 12-inch aperture suitable for both visual and photographic work, two single prisms and grating..... 650

Larger standard for telescopes, 10 inches aperture up to any size, with two single prisms and grating..... 1,000

Larger standard for telescopes, 10 inches aperture up to any size, with battery of two prisms and grating..... 1,375

Larger standard for telescopes, 10 inches aperture up to any size, with battery of three prisms and grating..... 1,500

Large star spectroscope, for telescopes 12 inches aperture up to any size, complete in all accessories.....$3,000 to 3,500

Single Prism Spectrographs, for line of sight work, made to order.

Spectroheliographs

Prices on various types of spectroheliographs furnished on request.

Price List of Gratings

Diameter of Surface	Character of Surface	Ruled Surface	Radius of Curvature	D	C	B	A
1.4-inch	Flat.....	0.75x1.2 -in. / 0.9 x1.03-in.	.....	$ 15	$ 20	$ 25	$ 30
	Concave...	0.5 x1.25-in.	4-ft.	20	25	30	35
		0.75x1.12-in.	3-ft.	25	30	35	40
2.5-inch	Flat.....	1.25x1.9 -in. / 1.5 x1.75-in.	.....	30	40	50	60
	Concave...	1 x2.1 -in.	6-ft.	40	50	60	70
		1.4 x1.9 -in.	4-ft.	50	65	75	85
4 inch	Flat.....	1.75x3.2 -in. / 2.25x3 -in.	.....	75	85	100	115
	Concave...	1.5 x3.5 -in.	10-ft.	90	110	130	150
		(2 x3.4) -in.	7-ft.	100	125	150	175
5 inch	Flat.....	2.5 x3.9 -in.	.....	125	150	175	200
		2.9 x3.6 -in.	.....	135	165	190	215
	Concave...	1.75x4.3 -in.	15-ft.	150	175	200	225
		(2.5 x3.9) -in.	10-ft.	175	200	225	250
6 inch	Flat.....	3 x5.4 -in.	.....	200	250	275	300
		3.5 x5.1 -in.	.....	225	275	300	325
	Concave...	2 x5.8 -in.	21-ft.	250	300	325	350
		(3 x5.4 -in.	15-ft.	300	350	375	400

Explanation of Symbols

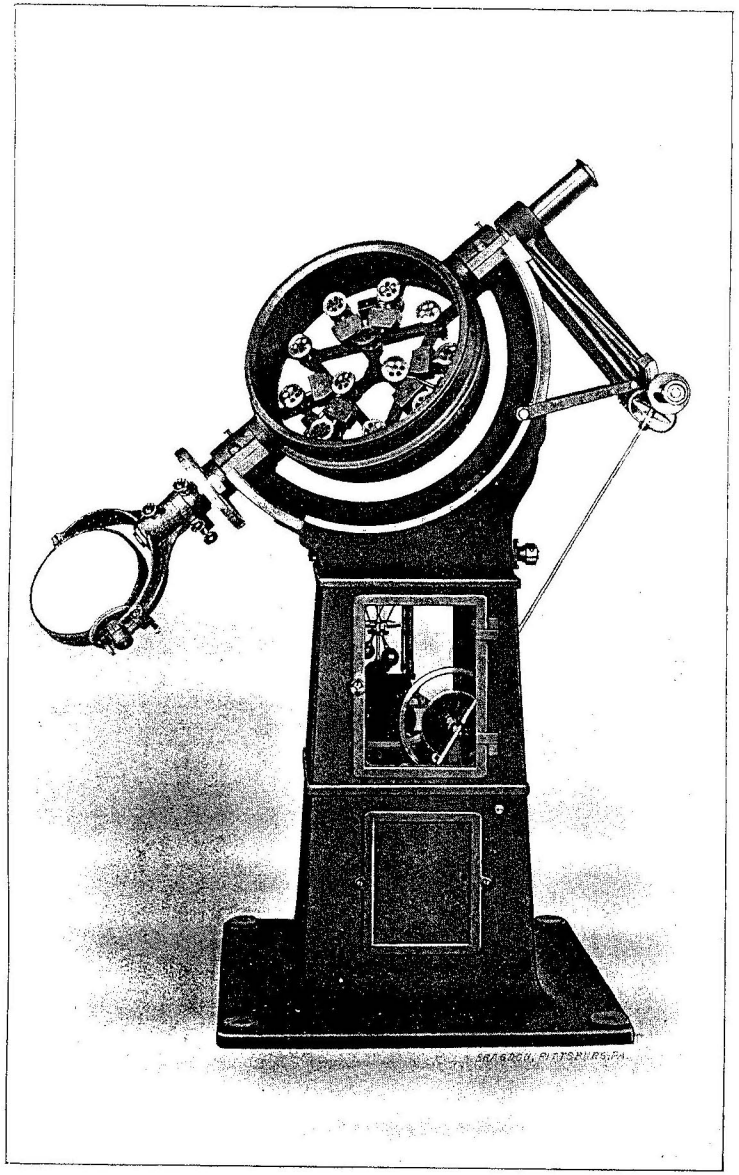
Gratings marked "B," "C" and "D" are all of the same general quality, as free from "Ghosts" as possible, but of varying degrees of excellence from the standpoint of brightness and definition.

Gratings marked "A" are distinguished as being particularly good in definition and in all other respects.

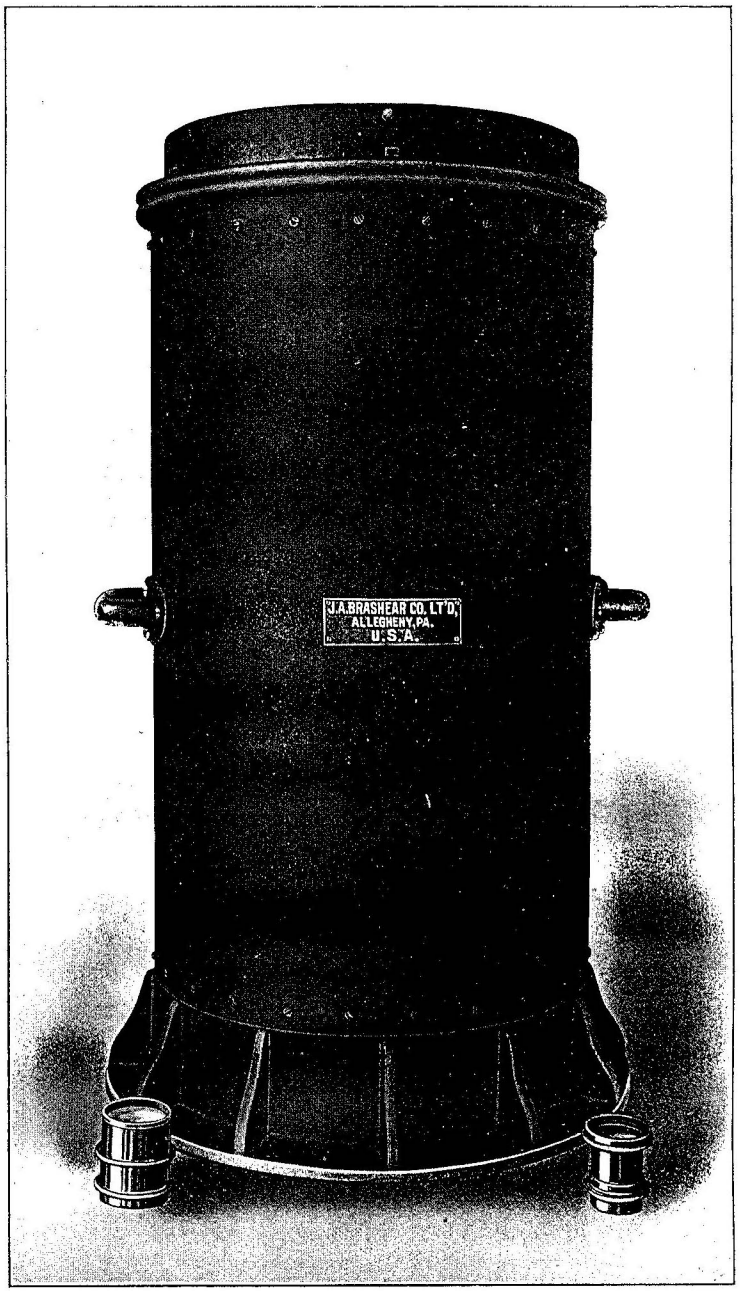
The width of the ruled space (length of ruled lines) is optional, except where a separate price is given in the case of a flat grating, and where the dimensions are given in parenthesis in the case of the concave grating. In this latter case a somewhat higher price may be charged on account of the greater difficulty of ruling perfectly a grating with long lines.

Gratings with length of lines or radius of curvature different from those specified in this list will be given a price proportional to these factors.

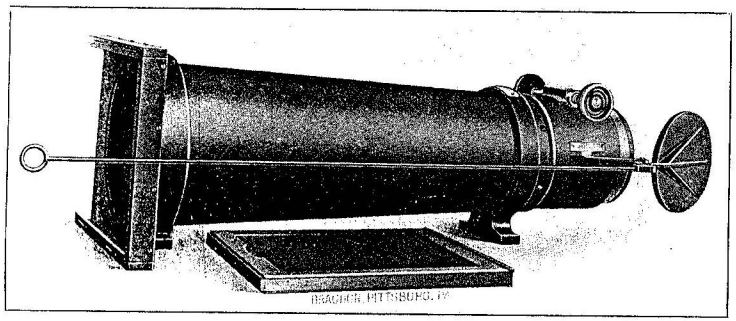
These gratings are ruled on Professor Rowland's engine, under the care of the department of physics of the Johns Hopkins University, Baltimore, Maryland. The plates are prepared by the John A. Brashear Co., Ltd., Allegheny, Pennsylvania, to whom all communications should be addressed.



Combined Coelostat and Siderostat.
One, two or three mirrors may be used if desired.
Any size up to 40 inches made to order.



16-Inch Astronomical Camera Objective and Cell.
Made for Dr. Max Wolf Konigstahl Observatory, of Heidelburg.
See page 34.

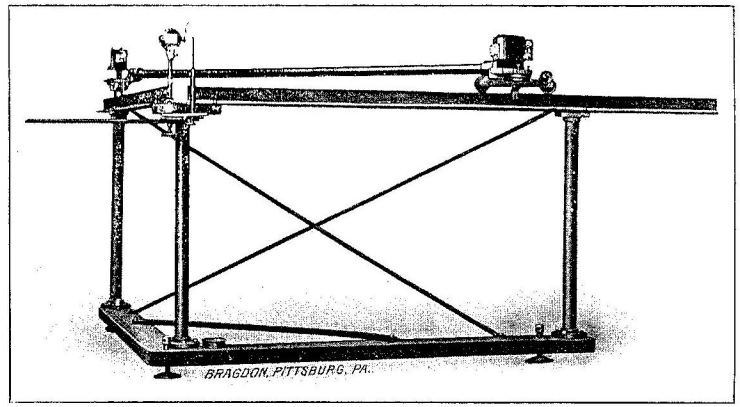


Photographic Doublets and Cameras for Astronomical Photography . . .

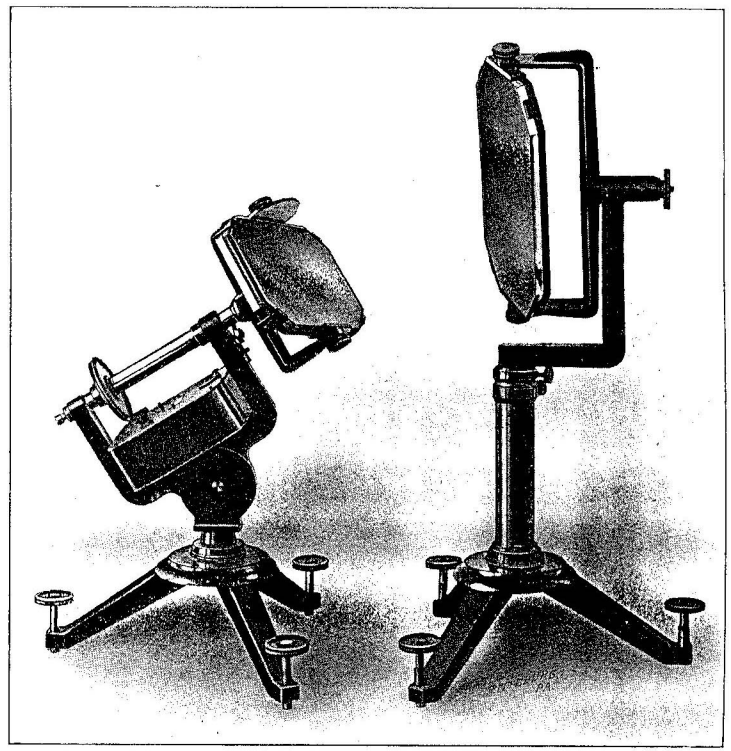
The above engraving shows camera ready for attachment to an equatorial. Special mountings provided when desired.

4-inch	Objective	with	Camera,	complete.....	$ 385
5 "	"	"	"	.....	550
6 "	"	"	"	.....	850
8 "	"	"	"	.....	1,650
10 "	"	"	"	.....	2,500
12 "	"	"	"	.....	4,500
15 "	"	"	"	.....	8,200

Larger sizes made to order.



Standard Type of Nos. 1, 2 and 3 Concave Grating Spectroscope.
The above instrument may be set on the laboratory floor. Nos. 4, 5 and 6 should be mounted on solid masonry piers, or attached to the walls of the laboratory by brackets. See page 36.



Two-Mirror Heliostat,
giving a 3½-inch beam; clock work runs eight days without rewinding. A very good heliostat for use with concave grating spectroscope.

Concave Grating Spectroscopes

Including Rails, Grating, Camera, Eye-piece, Grating Holder, Carriages, Quartz Condensing Lens and everything complete, except Micrometer

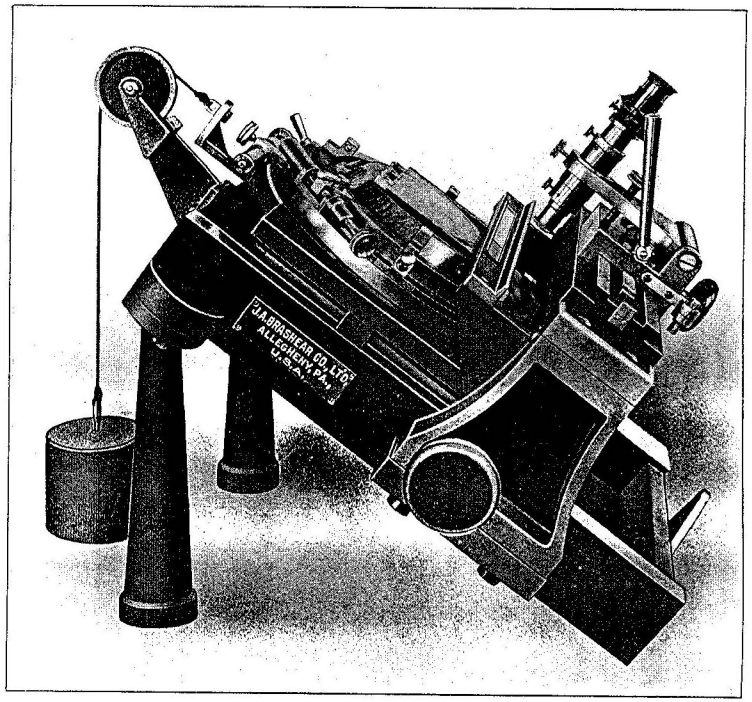
No. 1,	1¼	-inch	plate,	1⅛	-inch	ruled	surface,	4	feet	radius.....	$	195
" 2,	2	"	"	1⅝	"	"	"	5	"	"	.....	220
" 3,	2 7/16	"	"	2⅛	"	"	"	6	"	"	.....	250
" 4,	4	"	"	3⅝	"	"	"	10	"	"	.....	550
" 5,	5	"	"	4⅝	"	"	"	15	"	"	.....	950
" 6,	6	"	"	5½	"	"	"	21	"	"	.....	1,150

Micrometer for Nos. 1, 2 and 3.....$35 to $ 50
" " 4, 5 " 6..... 60 " 100
" " larger sizes ..... 90 " 150

Above prices include iron pedestals and base for Nos. 1, 2 and 3; the larger sizes should be set on piers, or bolted to the walls of the laboratory by brackets.

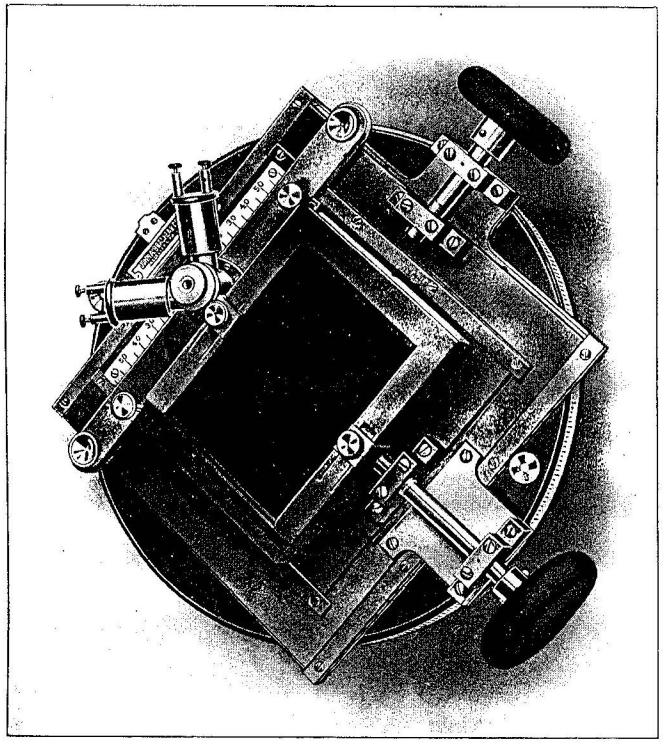
Two-mirror Heliostat for use with Concave Grating Spectroscopes giving 3½-inch beam, $110.

First surface mirrors for same made to order.

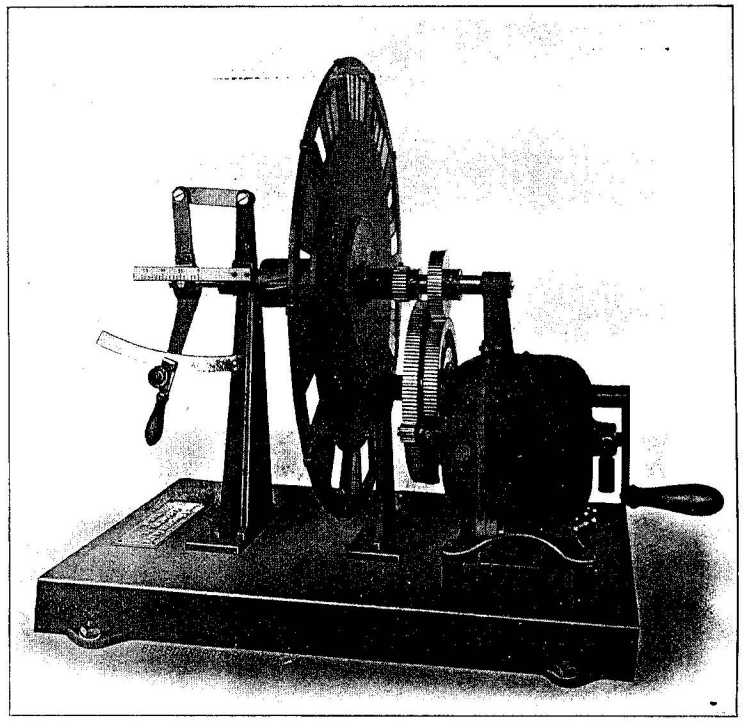


Measuring Engine for Stellar Photographs.

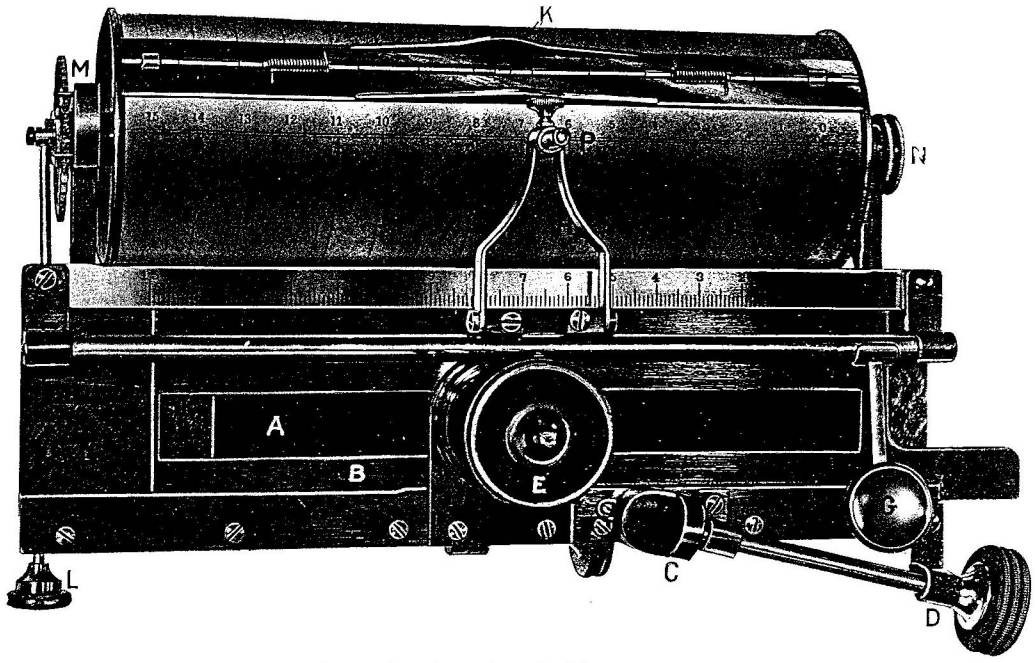
Made for any size of plate. These measuring machines are so constructed that all moving plates, plate holders, etc., are made of the same material, so that the coefficient of expansion and contraction will be constant. One surface of each of the bearings is treated by a method that insures a minimum of friction and ease of motion—so difficult to secure when the bearings of the same material come together. Prices on application.



Double Slide Photographic Plate-Holder,
with slow motion in both co-ordinates. Micrometer eye-piece with electric illumination.
We construct these plate-holders for any size negative.
Prices on application.

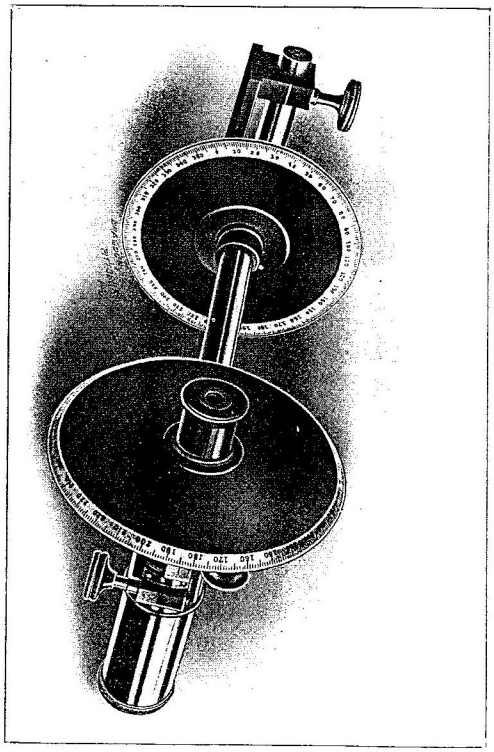


Disc Photometer.
May be driven by hand or electric motor. Sectors may be opened and closed while disc is rotating, and percentages read on scale. Price from $200 to $300.

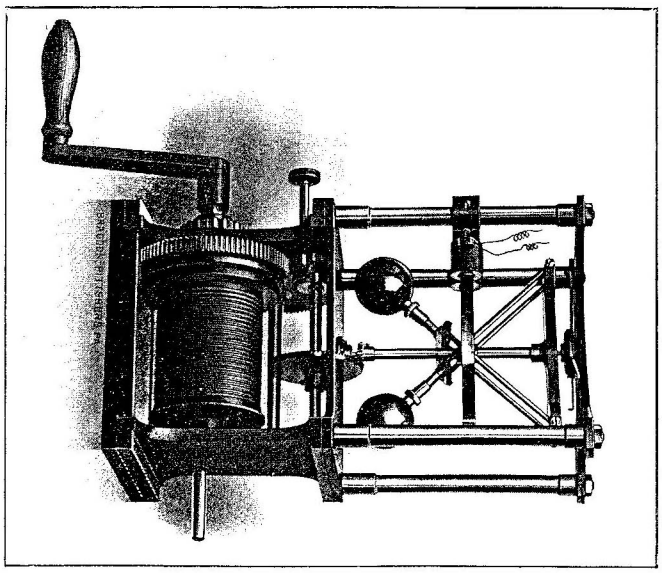


New Form of Wedge Photometer.

By a slight pressure upon the lever G, which actuates the stylus P, a record of the star's relative brightness is recorded on the prepared paper O. Pressure upon the button L moves the drum for the next record. By rotating the milled wheel D the compensated wedge A can be moved until the light of the star is obliterated, and again recorded. 45 records can be made before changing the paper. No artificial light need be used with this photometer, thus keeping the pupillary aperture constant during the time of observation.



Polarimeter. From $150 to $200.



Driving Clock. From $150 to $600.

Price List of Eye - Pieces for Telescopes, Spectroscopes, Etc.

Standard negative eye-pieces from 0.2-inch to 1.5-inch equivalent focus; each $5.00

Standard positive eye-pieces from 0.2-inch to 1.5-inch equivalent focus; each 5.00

Higher or lower powers made to order

Wide field Kellner eye-pieces; each	$ 6.00 to	$18.00
Wide field triple lens eye-pieces "	7.50 "	25.00
Hastings solid eye-pieces "	6.50 "	9.00
Herschel solar eye-piece		35.00
Polarizing solar eye-piece		50.00
Neutral tint sun cap		2.00
Four lens terrestrial eye-piece		10.00
Triple prism terrestrial eye-piece		35.00
Porro prism terrestrial eye-piece		35.00
Direct vision spectroscopic eye-piece		25.00

In addition to the Apparatus noted in this Catalogue, we furnish any of the following accessories:

Eye Pieces

Every type of positive or negative eye-piece, Kellner, achromatic, solid, double and triple lens wide field astronomical eye-pieces and prismatic terrestrial or erecting eye-pieces, also many other forms for special purposes.

Prisms

Objective prisms, composite prisms, crown and flint glass prisms of any angle or form, quartz, spar and rocksalt prisms, Rochon and Wollaston double image prisms.

We also make several forms of erecting and reversing prisms.

Refractometer and Sextant Mirrors

Refractometer and sextant mirrors of a high degree of accuracy. Other plane parallel mirrors for special purposes corrected to within one twentieth light wave if desired. Parallel shade glasses for use in observing the sun. Compensated dark wedges for photometric or solar observations.

Speculum Metal Mirrors

Plane, spherical or parabolic mirrors of speculum metal made to order.

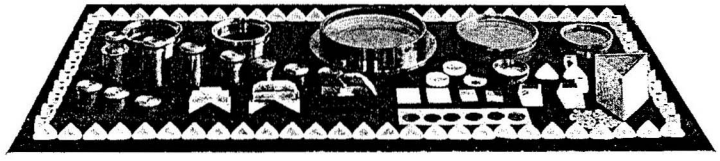
Special Apparatus

We are prepared to construct special apparatus of almost any kind required in the domain of physics, optics, horology, etc., and invite correspondence upon the same.

Domes for Astronomical Observatories

We furnish the running gear for small domes, say from 12 to 20 feet diameter, with blueprints of a simple construction so as to enable any good mechanic to build an observatory.

Contracts for domes of the largest dimensions can be made through our company, with running gear constructed by the well known firm of The Warner & Swasey Co., Cleveland, Ohio.



Murdoch, Kerr & Co.
Pittsburg