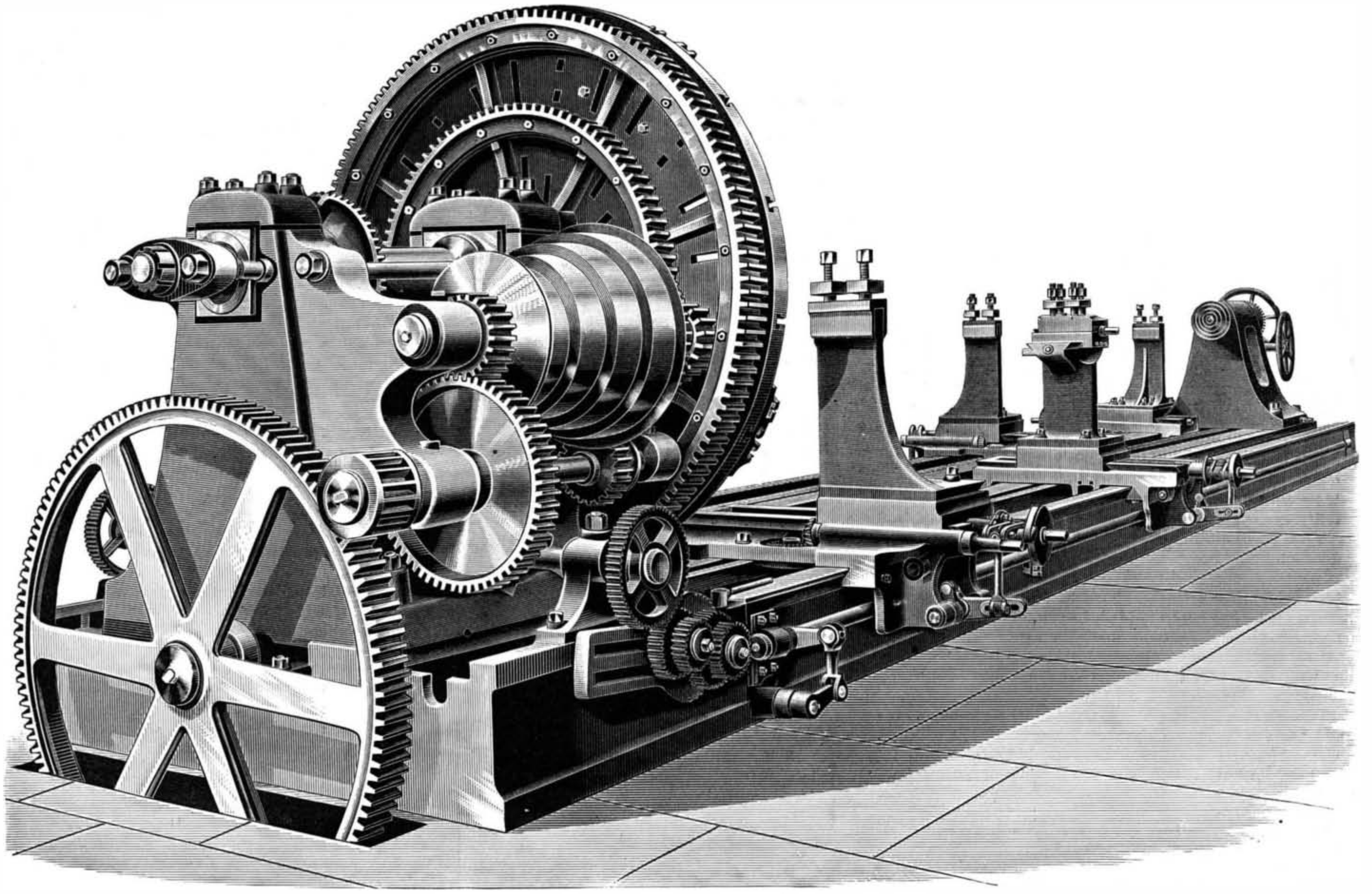
IMPROVED SLIDE AND SCREW-CUTTING LATHE.

This powerful lathe was recently made by Sharp, Stewart & Co., Atlas Works, Glasgow. The height of centers is 5 ft., and it admits between centers a length of 50 ft. 6 in., and the net weight complete is about 120 tons. The fast headstock has a steel spindle running in gun metal parallel steps, and the driving power is arranged with two series of triple gear for large diameters, as well as quicker speeds for ordinary work. The face plate is 10 ft. diameter, and is fitted as a four-jaw chuck, with hardened steel jaws. The loose headstock is of very powerful design, and, in view of the heavy pieces swung between the centers, the spindle has a "special" adjustment by a worm and wheel, as well as a quicker movement for bringing the spindle into position before the weight is upon it. The beds are of double form, and of very massive construction. There are four saddles, three being provided with a special rest for dealing with crank shafts, and one has a compound slide rest, with a swivel for taper work, this being interchangeable with the others. There are two guide screws, independently driven, for actuating the saddles, and the feed motion to each saddle is also independent. The two front saddles have an auxiliary feed—besides the ordinary one—for grooving cranks and cutting off the ends of steel ingots. Throughout, this lathe is of the most powerful character, and is capable of taking the heaviest cuts in steel.—*The Engineer.*



IMPROVED SLIDE AND SCREW-CUTTING LATHE.

Gems of the United States.

Mr. G. F. Kunz of this city has been exploring this field, and has collected information on the production of precious stones, more valuable because more thorough than has previously been done, from which we quote the following:

Turquoise, which was worked by the Aztecs before the advent of the Spaniards and since then by the Pueblo Indians, and largely used by them for ornament and as an article of exchange, is now systematically mined near Los Cerrillos, N. M. Its color is blue, and its hardness is fully equal to that of the Persian, or slightly greater, owing to impurities, but it lacks the softness of color belonging to the Persian turquoise. From time immemorial this material has been rudely mined by the Indians. Their method is to pour cold water on the rocks after previously heating them by fires built against them. This process generally deteriorates the color of the stone to some extent, tending to change it to a green. The Indians barter turquoise with the Navajo, Apache, Zuni, San Felipe, and other New Mexican tribes for their baskets, blankets, silver ornaments, and ponies.

The finest garnets and nearly all the peridots found in the United States are obtained in the Navajo Nation, in the northwestern part of Mexico and the northeastern part of Arizona, where they are collected from ant hills and scorpion nests by Indians and by the soldiers stationed at adjacent forts. Generally these gems are traded for stores to the merchants at Gallup, Fort Defiance, and Fort Wingate, who in turn send them to large cities in the East in parcels weighing from half an ounce to thirty or forty pounds each. These garnets, which are locally known as Arizona and New Mexico rubies, are the finest in the world, rivaling those from the Cape of Good Hope. Fine gems, weighing from two to three carats each and upward when cut, are not uncommon. The peridots found associated with garnets are generally four or five times as large, and from their pitted and irregular appearance have been called "Job's tears." They can be cut into gems weighing three or four carats each, but do not approach those from the Levant either in size or color.

In Arkansas, especially in Garland and Montgomery Counties, rock crystals are found lining cavities of variable size, and in one instance thirty tons of crystals were found in a single cavity. These crystals are mined by the farmers in their spare time and sold in the streets of Hot Springs, their value amounting to some $10,000 annually. Several thousand dollars' worth were cut from quartz into charms and faceted stones, although ten times that amount of paste or imitation diamonds are sold as Arkansas crystals.

The well known agatized and jasperized wood of Arizona is so much richer in color than that obtained from any other known locality that, since the problem of cutting and polishing the large sections used for table tops and other ornamental purposes was solved, fully $50,000 worth of the rough material has been gathered, and over $100,000 worth of it has been cut and polished. This wood, which was a very prominent feature of the Paris Exposition, promises to become one of our richest ornamental materials.

Of the corundum gems (sapphire, ruby, and other colored varieties) no sapphires of fine blue color and no rubies of fine red color have been found. The only locality which has been at all prolific is the placer ground between Ruby and El Dorado bars, on the Missouri River, sixteen miles east of Helena, Mont. Here sapphires are found in glacial auriferous gravels while sluicing for gold, and until now have been considered only a by-product. Up to the present time they have never been systematically mined. In 1889 one company took the option on 4,000 acres of the river banks, and several smaller companies have since been formed with a view of mining for these gems alone or in connection with gold. The colors of the gems obtained, although beautiful and interesting, are not the standard blue or red shades generally demanded by the public.

A very limited number of diamonds has been found in this country. They are met with in well defined districts of California, North Carolina, Georgia, and recently Wisconsin, but up to the present time the discoveries have been rare and purely accidental.

Chlorastrolite in pebbles is principally found on the inside and outside shores of Rock Harbor, a harbor about eight miles in length on the east end of Isle Royale, Lake Superior, where they occur from the size of a pin head to, rarely, the size of a pigeon's egg. When larger than a pea they frequently are very poor in form or are hollow in fact, and unfit for cutting into gems. They are collected in a desultory manner, and are sold by jewelers of Duluth, Petoskey, and other cities, principally to visitors. The annual sale ranges from $200 to $1,000.

Thomsonite in pebbles occurs with the chlorastrolite at Isle Royale, but finer stones are found on the beach at Grand Marais, Cook County, Minn. Like the chlorastrolites, they result from the weathering of the amygdaloid rock, in which they occur as small nodules, and in the same manner are sold by jewelers in the cities bordering on Lake Superior to the extent of $200 to $1,000 worth annually.

At New Milford, Conn., a property was extensively worked from October, 1885, to May, 1886, for mica and beryl. The beryls were yellow, green, blue, and white in color, the former being sold under the name of "golden beryl." No work has been done at the mine since then. In 1886 and 1887 there were about 4,000 stones cut and sold for some $15,000, the cutting of which cost about $3,000. The production of precious stones in this country in 1889 amounted to $188,000.

An Important Tunnel.

The greatest engineering feat in the history of the anthracite coal mining is about to begin. It is the commencement of what will be known as the Jeddo Tunnel, which will be driven for the purpose of draining the flooded mines of Jeddo and Harleigh. It will be constructed from Butler Valley, Pa., to the bottom of Ebervade mammoth vein, a distance of three miles, through solid rock, to be 8 feet square in the clear. The scheme of tunneling through the mountain first occurred to John Markle, who is to be president of the company, which will bear the title of Jeddo Tunnel Co., Limited. It will open an inexhaustible supply of coal and furnish employment for thousands of people for many years to come. It will also serve the double purpose of draining all the collieries in the valley.

Writing Inks.

Writing inks can be made equally well from galls and tannin, but inks made from galls are preferable for copying purposes, as they have much greater "body," owing to the extractive matter derived from the galls. The following formulæ are taken from notes by Dieterich quoted by the *Pharmaceutische Central-halle*. The peculiarity of the first set of formulæ is that they start from the extract of galls and solution of tannin, to which, after filtration, a definite amount of ferric-chloride solution is added, and, after standing three weeks, these ferrated solutions are filtered. We shall call these ferrated solutions "gall basis" and "tannin basis" respectively. They really are the ink, but it is necessary to add coloring matter in order to make the writing visible. On exposure to the air, the writing becomes black. Chinese galls are preferable to oak galls for ink making, as they contain most extractive matter. To make the

GALL EXTRACT,

reduce 6 oz. of Chinese galls to No. 20 powder, and digest in a pint of water for twelve hours. Strain, press the marc, and digest it again in 12 ounces of water for twelve hours, repeating the pressure at the end of this time. Now add to the strained liquors 5 drachms of powdered French chalk. Set aside in a cold place for twenty-four hours, then filter, washing the filter with as much water as will make the filter measure 30 ounces.

TANNIN SOLUTION.

This is made by dissolving 3 ounces of commercial tannin (it need not be the purified medicinal kind) in sufficient water to make 30 ounces of solution.

GALL BASIS.

To 10 ounces of the gall extract add 1 ounce of 10 per cent solution of ferric chloride, made by dissolving the salt in distilled water. Allow the mixture to stand in a corked bottle for three weeks and filter.

TANNIN BASIS.

Made in the same way, using 10 ounces of the tannin solution and 1 ounce of iron solution.

BLUE-BLACK OFFICE INK.

Gum arabic	⅛ ounce.
Aniline water-blue, I.B.	75 grains.
Glycerine	1 fl. drachm.
Water	12½ ounces.

Mix these with 18 ounces of gall basis or the same of tannin basis, and set aside in a closed vessel for a few weeks to clear. Then fill into small bottles, preferably stone bottles, so as to keep away from the light.

This ink writes a beautiful blue color, dries very readily on the paper, and changes to a good blue-black. It is of good quality, and is well liked. It is not a copying ink.

A RED-BLACK INK,

which is identical with the above in quality only that it writes red, changes to reddish-brown, and finally to a deep brown-black, can be made by using 150 grains of Ponceau BB. (a red aniline color) in place of the aniline water-blue. The following colors may also be obtained:

Violet-black.—Mix together 2 parts of the red-black and 3 parts of the blue-black inks.

Green-black.—Omit the aniline water-blue from the blue-black formula, and use 150 grains of aniline green D.

Blue green-black.—Mix together 2 parts of blue-black and 3 parts of green-black. A nice color is also obtained by adding 8 to 15 grains of aniline green to the blue-black ink.

Deep-black.—Omit the aniline water-blue, and use in its place 5 drachms of aniline deep-black E.

COPYING INKS.

The following are made with the same bases as the foregoing:

King's Copying Ink.

Gall basis	24 ounces.
Aniline water-blue, I.B.	150 grains.
Glycerine	2 fl. drachms.
Gum arabic	5 drachms.
Sugar	150 grains.
Water	8 ounces.

Mix and set aside for a few weeks as above directed.

A ruby ink is made by using 150 grains of Ponceau R.R. in place of the aniline water-blue. Both the inks and the copies ultimately turn jet-black. Other colors are obtained with aniline green D, 150 grains; deep-black E, 5 drachms; and indigo-carmine, 150 grains each, in place of the aniline blue.

INK EXTRACTS.

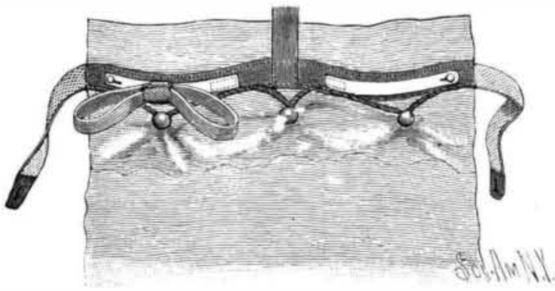
The following quantities are intended for a wine-bottleful of rain water. The powder is to be added to the water, and the mixture gently boiled for from fifteen to twenty minutes, and when cold the ink should be bottled and set aside for four weeks before using:

	Plain.	Copying.
Tannin	1 ounce.	9 drachms.
Dried sulphate of iron	3⅞ drachms.	4 "
Gum arabic	75 grains.	2 "
Sugar	40 "	75 grains.
Aniline water-blue, I.B.	40 "	75 "

Other colors may take the place of the aniline blue as in the preceding formulæ.

A BEDCLOTHES FASTENER.

The illustration represents a device more particularly designed to prevent children from becoming uncovered when sleeping in bed, at the same time stopping them from lying on their backs, and thus preventing nightmare and snoring. A band is arranged to extend across and be attached at or near its ends and middle to the upper end of the under side of the top sheet or cover. The attachment is made by cords fastened to the band and secured by a whip grip around balls of rubber, cork, or wood, incased by the sheet. To each end of the main band are attached elastic extensions, to be secured by eye-holes on screw-hooks on the side of the bedstead, a branch band also extending to a similar fastening on the head of the bedstead, there being more than one branch band if more than



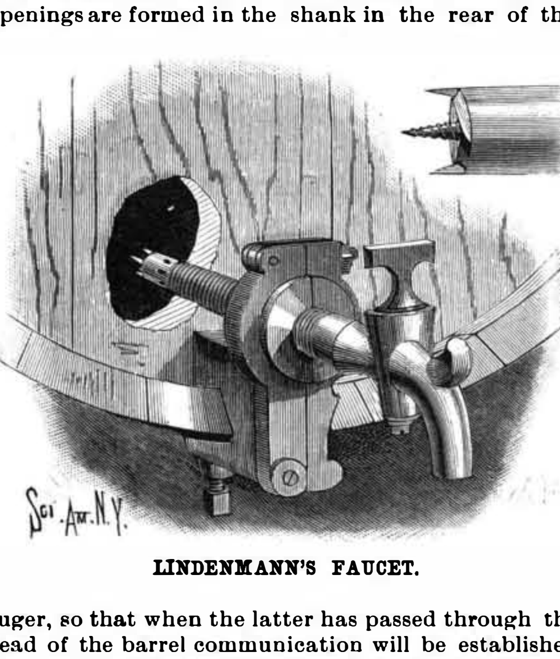
ANGELL'S BEDCLOTHES FASTENER.

two persons sleep in the same bed. Upon the under side of the transverse loop-like body band are band slides on which slide loops, to each of which is attached a double shoulder strap, adapted to fit comfortably over the shoulders of a child or other person, and partly made up of elastic webbing. This strap is intended to allow sufficient freedom of the limbs and body, but prevent one having it on lying on the back. The shoulder strap is put on the child before the latter is put to bed, and is then attached to the slide.

Further information relative to this invention may be obtained of the patentee, Mr. C. E. Angell, Box 75, Salt Lake City, Utah.

A DEVICE FOR TAPPING BARRELS.

A novel form of faucet and attachment, by means of which the faucet may be made to form its own opening into a barrel at any desired place, is shown in the accompanying illustration, and has been patented by Mr. William Lindenmann, of No. 93 Gilden Street, New Brunswick, N. J. A frame or block, having an angular recess adapted to engage one of the staves of the barrel head, is secured to the barrel by a set screw. On the frame is an upwardly extending arm carrying a pivot pin, on which is pivoted a second arm adapted to close on the first arm, and be fastened thereto by a pivoted bolt passing through slots in both arms at their upper ends, a nut screwing on the end of the bolt to clamp the arms together. The two arms are adapted to hold in place a sectional nut, of polygonal shape on its inside, and fitting in correspondingly shaped recesses in the arms, thus preventing the nut from turning. This nut is adapted to be engaged by a screw thread on the shank of a faucet, which has its rear end formed into an auger adapted to screw into the head of a barrel. Openings are formed in the shank in the rear of the



LINDENMANN'S FAUCET.

auger, so that when the latter has passed through the head of the barrel communication will be established between the interior of the barrel and the bore in the shank of the faucet.

THE Shepherd Sewerage System Co., of N.Y., whose automatic valve has been patented in this country and Europe, have recently established a branch office at 109 East Fayette Street, Baltimore, Md. This invention has been tested in this city and elsewhere.

In this system a valve is used which is claimed to be proof against clogging and which will automatically and periodically discharge the contents of the lower end of the drain pipe into the sewer, at the same time cutting off the gases from flowing back into the house.

The New French Steamship La Touraine.

This, the first twin screw vessel of the French line, arrived in New York from Havre on her maiden trip on June 26, covering 3,177 miles, by a long southerly route. Her average hourly speed was 18·41 knots, and her daily runs were: 507, 450, 451, 442, 456, 481, and 390 knots. Her furnaces burned 240 tons of coal a day, and her propellers made 74 to 75 revolutions a minute. Her engines developed 12,000 horse power, or 1,000 less than her maximum capacity, although forced draught was used throughout the voyage.

La Touraine was built by the Compagnie Generale Transatlantique, in their own ship yards at Penhouet, near St. Nazaire, France. Her keel was laid more than two years ago, so that ample time has been taken in her building. She is 540 feet in length, 57 feet in width, and has a depth of hold of 38 feet. Her burden is 11,675 tons. At the trial trip before the French commissioners the minimum speed attained was 19½ knots. This rate was increased to 20½ when the ventilators of the engines were in operation. During her passage from St. Nazaire to Havre the steamer made the distance between the two ports in 20 hours and 30 minutes, which gives a speed superior to 21 knots.

She has two triple expansion engines of 11,000 horse power, nominal, and can, it is said, easily be brought up to 13,000 each. The engines are separated by a longitudinal water tight bulkhead, and each engine normally operates but one of the two screws. The vessel has all the latest improvements in marine construction and is divided into fourteen water tight bulkheads, which form a safeguard against sinking in case of accident or collision.

There are 36 special cabins, 6 of which contain large double bedsteads, bathrooms, and wardrobes, 8 cabins with 2 beds each, 4 cabins for a single person, 15 for 2, and 3 for 3, on the promenade deck, all for first class passengers. There are 45 large cabins for second class passengers, 21 of which are for 2 persons and 24 arranged to accommodate 3 persons. There are 20 bathrooms, independent of those connected with the special cabin, for the accommodation of cabin passengers. The lower deck has accommodations for 600 emigrants. Taken in all, the vessel can accommodate 1,090 passengers—392 first class, 98 second, and 600 steerage.

The Recent Transit of Mercury.

In the June *Sidereal Messenger*, Dr. E. E. Barnard, of Lick Observatory, gives the following brief report:

The transit of Mercury was successfully observed here on May 9 with the 12 inch equatorial.

The day proved clear throughout, though the preceding few days promised anything but a clear day for the 9th.

The first and second contacts were observed, the planet being sharply caught at the position angle predicted by Mr. Schaeberle:

1st contact 1891, May 9, 3 h. 46 m. 32·7 s., Mt. Hamilton, M. T.
2d contact 1891, May 9, 3 h. 51 m. 19·9 s., Mt. Hamilton, M. T.

I also made forty-six filar micrometer measures for the polar and equatorial diameters of Mercury, and eleven measures of the position of the planet on the sun's disk.

No trace of Mercury could be seen before first contact, though it was carefully looked for, nor was that portion off the sun visible between first and second contacts. No bright spot was seen on the planet, nor any atmospheric ring—such as was seen about Venus at the transit of December 6, 1882. A careful examination of the sun's disk showed nothing that could be taken for a satellite.

Some excellent photographs of the transit were made by Mr. Burnham with the 12 inch between the micrometer measures.

As a matter of popular interest, I would say that a preliminary reduction of the measures for the planet's diameter gives 2,960 miles for that value, which must be taken as altogether provisional, until the measures are thoroughly reduced. The measures do not indicate any polar compression.

NOTE.—The times of contact expressed in standard Pacific time (8 h. slow of Greenwich) would be

1st contact, 3 h. 53 m. 7·0 s.
2d contact, 3 h. 57 m. 54·2 s.

MR. CHARLES H CRAMP is authority for the statement that it is entirely out of the question for an American shipbuilder to duplicate exactly a British ship or to follow out British specifications and plans, because American vessels are in advance, and there is no comparison when the outfit of the vessel is considered. Another point he makes is the fact that when foreign shipbuilders are asked to duplicate an American ship, or build entirely on American plans or methods, they always ask as much as American builders. This has been confirmed by evidence furnished by Mr. Cramp, and the whole summing up means that a contract for an inferior vessel will not be undertaken here on competitive terms, but that our shipbuilders stand ready to duplicate first-class steamers at the same cost of construction as abroad.—*Marine Journal.*