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 The Silver and Brass Sign Industry.—A unrious industry, but
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tween the States, now that thirty years have elapsed our standing, in a possible war, has been impaired. since its conclusion, still plays its baleful part in iupoverishing the nation. During a part of its continuance its expense was put at one million of dollars per diem. Now it costs nearly one half of that in one single item of revenue expenditure.

passions awakened by war have sunk to rest; but the power has been the controlling element which has ulfinancial effects are still felt and will be felt for years to come unless they are overwhelmed by the weight of it. His conclusions are largely based upon the Euronew misfortunes which may be brought upon us by pean wars of the time of Nelson, and the late civil another war. For, like a lightning stroke out of a war in America. clear sky, an issue is suddenly created between the In view of recent startling and ominous develop-United States and England, which, incredible as it ments in the diplomatic relations of this country and would have seemed a week ago, may lead to war. If Great Britain, it will be, we think, timely and interit does, the conflicts of past generations will sink into esting to inquire into the present status of the navies insignificance compared with the new one, and every of the two countries, and also to inquire as to what quarter of the globe will be involved in a struggle are the battleship-building resources possessed by which will put back the cause of civilization and of each. It should be noted that in the subjoined tables independent government to an extent which can be no account is taken of ships that possess a speed of measurable only by centuries.

Out of the overgoverned nations have emerged two powers which represent the greatest freedom of gov-but within measurable distance of completion-such, ernment. These two nations are objects of jealousy for instance, as the Iowa-are included in the followand dislike to the rulers of almost despotic type which | ing tabulation: are over the older countries. In England, as in the United States, there is true representative government. The maintenance of the royal family is merely the figurehead of a monarchy and need rank as little more than as a harmless extravagance. The real government is as free and as representative as ours. If the two great powers which are representative of the highest degree of freedom in governmental affairs undertake an internecine war, it means the relegation of mankind to a still firmer grasp of despotic or imperial rule.

England in the past has been very aggressive. She has acquired great colonies by methods which her own historians and moralists condemn. Recently she seems to feel that she has enough, and her methods have changed, for the England of to-day is far different from ? the England of fifty years ago. Any accessions of territory she may contend for are sought by far more moderate methods than of old.

Some seventy years ago the Monroe doctrine was enunciated by the United States. This doctrine, opposing the increase of the territory of any European government on the western hemisphere, seems to have been justified at the time by the events in Europe. To-day, pushed to its utmost development, it would make us the guardian of almost all the western hemisphere. We should logically feel that we are at the beck and call of every neighboring South American republic to fight its battles against European powers. This is a pretty serious burden. It may lead to congratulatory messages from the countries whose cause we espouse, but it will act as a constant menace to our peace.

But the Monroe doctrine never will or can lead us into a more fatal consequence than a war with England. Our every interest is so tied up with her that whatever our animus may be, the contest would have the aspect of a civil war. The similarity of natures, the identity of language, the ties of blood relationship between the two countries, the friendship engendered by the great amount of intercourse which has of late years obtained between the two lands, are elements which would give to any contest the nature of fraternal strife. The business aspects of the case . 16674 are no less serious. Our vast exports are sold to England and are carried in English ships. She is our great customer for cereals and cotton and other products in which we act as almost the world's purveyor. If a war occurs between us and our best customer, every blow we strike at her prosperity is a blow at our own.

The first week of the war would do incalculable millions of damage; the succeeding weeks would see republican and representative government made contemptible in the eves of the world, while lives and property would be annihilated in battles of unimagined destructiveness.

The simple message of the President, which message seemed to threaten war, has already had far-reaching consequences. The fall in prices of securities and in produce represents an enormous aggregate. This would tend to bring people to their senses, unless by the perversity of human nature the misfortune be seized upon as an excuse or a reason for incurring others—a species of desperation which may find a precedent easily enough in the workings of human nature.

The finances of the United States, under what seemed to be conservative treatment, were progressing satisfactorily. Difficulties had arisen and had been met by

the issue of bonds, and new issues were contemplated. The SCIENTIFIC AMERICAN occupies a unique posi- All this went on smoothly because of the high credit of tion in the press of the United States. It is devoted the country. Now, a week has changed it all. The to what may in the best sense be termed the arts of further issue of bonds in proportion as it becomes more peace. It presents a view of the world of science and of difficult, appears more necessary. The very hopes of practical achievement to its readers, the creative side the Administration are defeated by its own act. The of mankind having it as an exponent. In political Christmas season of 1895 will be long remembered by economy sound doctrine regards destruction of life those ruined in the crisis brought about by needless and of property as a world's loss, not as the loss only of precipitancy. Already in the impairment of the value the person or persons directly affected. The war be- of securities and in the injury to the country's credit

THE NAVAL RESOURCES OF THE UNITED STATES AND THE BRITISH EMPIRE-A COMPARISON.

Captain A. Mahan, of the United States navy, has pointed out in his celebrated work on the influence of The blue and the gray are again united; the evil sea power in history, that a preponderance of naval timately brought victory to the nation that possessed

> less than 71/2 knots per hour, or that are armed with obsolete smooth bore guns. Ships that are building,

FIRST-CLASS BATTLESHIPS OF THE LINE.

•	Total number. United States 4 ships.	Average displacem nt. 10,568 tons.	Average speed. 16:42 knots.	Belt armor. 18 in.	Total displacement. 42,274 tons.	
è	Great Britain. 29 "	13,000 "	17.47	18 "	376,900 "	
	SECOND-CLASS BATTLESHIPS.					
ſ	United States 3 ships.	5,703 tons.	16.7 knots.	12 in.	, 17,110 tons.	
•	Great Britain. 12 "	9,502 "	13.63 " 14	to 24 ''	114,030 "	
3		THIRD-CLASS	BATTLESHIPS.			
1	United States 5 ships.	4,401 tons.	11.9 knots. 7	to 12 in.	22.020 tons.	
-	Great Britain. 11 ''	7,075 "	13.43 " 81	to 12 "	77,820 "	
	1 00		DAMMT POTTES			

United States-The 6 knot boats ar med with smooth hore guns are reckoned

as obsolete. Great Britain. 13 ships. 4.040 tons. 11 knots. 8 to 12 in. 52,530 tons. TOTAL BATTLESHIPS OF ALL CLASSES. United States...... 12 ships, with a total displacement of 81,404 tons.

Great Britain 65

In estimating the relative strength of the two navies from the above table, it must be borne in mind that the basis for comparison should be the total displacement, rather than the total number of ships. Displacement is the capital which the naval designer has to go upon; and if he make a judicious distribution of weights, he will always produce the more effective fighting machine out of the bigger ship. If a 10,000 ton and a 15,000 ton ship carry the same armament, the larger vessel will carry that armament more steadily, more speedily, with greater command, and, owing to the wider separation of the individual gun stations, with less exposure to disablement of guns and crew. Estimated on this basis, Great Britain possesses a superiority of fighting power in first-class ships-ofthe line of 9 to 1. In battleships of all classes the superiority is 7½ to 1.

FIRST-CLASS ARMORED AND PROTECTED CRITISERS

.	FIRST-CLASS AREGRED AND PROTECTED CRUIRERS.							
1	(Of 20 knots speed and upward.)							
	Total number.	Average dis- placement.	Average speed.	Total dis- placement.				
	United States. 5 ships	7,700 tons	219 knote	38,500 tons				
	Great Britain 9 "	9,233 "	21.0 "	83,100 "				
Ì	FIRST-CLASS ARMORED AND PROTECTED RUISERS.							
•	(Of 1934 knots and under.)							
	United States none	_	-	_				
,	Great Britain 21 ships	7,581 tons	17.0 knots	159,200 tons				
,	SECOND AND THIRD CLASS PROTECTED CRUISERS.							
•	United States 14 ships	3,288 tons	18:23 knots	46,028 tons				
	Great Britain 60 "	3,828 "	19-20 "	229,605 "				
;	LOOKOUT CRUISERS.							
,	United States 5 ships	1,519 tons	16 [.] 73 knots	7,593 tons				
	Great Britain 19 "	1,907 "	17.00 "	36,240 "				
	GUNBOATS.							
	United States 7 ships	1,007 tons	16:00 knots	7,300 tons				
	Great Britain 34 "	841 "	19:00 "	28,580 "				
•	TOTAL CRUISERS OF ALL CLASSES.							
	United States 31	ships, with a to	tal displacement	of 99,421 tons.				
	Great Britain143			·· 586,725 ··				

Estimated, as before, on the basis of displacement, this table shows a preponderance for Great Britain in cruisers of 5½ to 1.

Of merchant steamers which are built to meet the naval requirements for conversion into cruisers, the United States have 4 and Great Britain 26.

TORPEDO BOAT DESTROYERS BUILT AND BUILDING.

′		Number.	Displacement.	Speed_
9	United States			
5	United States Great Britain	62	250 tons.	28 knots
-			PEDO BOATS.	
	United States	·		
:	Great Britain			164

By displacement, the preponderance in torpedo boats is 40 to 1.

Summing up the totals for battleships and cruisers The range of action of the modern warship is limited but just past the full by a few hours. New moon occombined, we get:

United States......... 43 ships, with a total displacement of 180,825 tons. Great Britain 208 " " " " 1,158,005 " fighting ships of all descriptions of $6\frac{4}{10}$ to 1.

the odds against which we should have to contend at the outset.

As against this unpromising opening it will be urged that we are a resourceful and energetic people, and that we should quickly create a navy. To this it must be answered that modern navies are of slow growththey are not created. The modern battleship, costly and intricate, puts a heavy discount upon mere resourcefulness and energy, of which we have abundance, and a heavy premium upon gun, ship, and armor can be regarded as an altogether satisfactory substibuilding plant, of which, for the magnitude of the task in hand, we should find that we possessed an altogether inadequate supply. With every factory, mill and Terrible, of 14,000 tons displacement, now building at a minimum on the 9th, half an hour after mid-

There is no sentiment in statistics.

six ships to our one, as the following facts will show: ships. In reply to inquiries instituted by the British Admiralty last year to ascertain the extreme warship building capacity of the private yards, it was found that, if these firms were given a free hand as to the details of the designs, they could build another navy, equal evening, so that by 10 o'clock he is well above the two months. When brightest, it is sometimes of the in fighting strength to the whole existing British navy, roofs and trees. The position of this planet among third magnitude. do so.

should have to engage this colossal navy, with the paratively nearby and insignificant planet. power of reduplication which lies behind it, unaided.

ink is scarce dry upon the paper in which our general inificant when studied in his own character of a giant in chief, Nelson Miles, has just told us that the very planet. It is an impressive thing, to any thoughtful opening of hostilities with a great naval power would person, to look upon a globe 1,300 times as large as the see every sea-coast city, on the Atlantic and Pacific, earth, and contemplate the bare possibility of its besubject either to the humiliation of an indemnity or ing inhabited, either now or at some future time. If to the horrors of bombardment.

that the United States would not submit to a conflict strongly tempted to reply, "The planet Jupiter, with merely defensive—that her enterprise would soon cause his circling moons." There—and it is a spectacle not the field of naval operation to become conterminous reserved for the possessors of the largest telescopes with the shore lines of both hemispheres. The esti- one perceives the law of gravitation operating visibly mate consequently assumes that the total force of both on an enormous scale; one sees globes larger than the fleets would be available.

THE UNITED STATES BUREAU OF STEAM ENGINEERING.

Engineer-in chief Geo. W. Melville, in his annual report for 1895, recommends that the sum of \$300,000 be planet; and the movement of clouds; and the alignspent in providing the cruiser Atlanta with new ma- ment of zones, shading off from a brilliant equator to chinery and altering her from a single to a twin-screw

According to Brassey's Naval Annual, the Atlanta fire guns, and eight smaller quick-fire guns.

obsolete type, the hull is "an excellent one, and well succession, and when he leaves the telescope the face their machines all the way from Minneapolis. The worth new machinery." With machinery of 5,400 of Jupiter will have resumed the appearance it had at route they traveled was 2,856 miles long, and they a cruiser equal to any of her class afloat." The new is strangely and wonderfully variegated. 18 and 19 knots an hour.

The same changes are recommended for the Boston, a sister ship. The Chicago is at present being reengined.

In these days of high speed cruisers, the above addition of 2 knots to the speed of these boats will practically add two new ships to our navy.

The value of liquid fuel for marine purposes is being determined by a series of tests on one of the torpedo and on the 1st rises about 6 A. M. boats of the Maine. It is recommended that one of the gunboats building at Newport News be made use on the 1st about 3 A. M. and on the 31st about 1 A. M. of to carry out these experiments on a larger scale. But there are few who will care to break their rest machines to standard proportions. Naval designers the world over have for some time even for the sake of beholding that most singular of past recognized the fact that if the use of liquid fuel celestial objects, a planet with rings, especially since, already to agree upon standard sizes or parts, such as can be rendered practicable in the navy, it will largely in the spring, Saturn will rise early in the evening. increase the radius of action of seagoing ships. To the United States the question of the use of petroleum Neptune is in Taurus, well situated, but too faint for almost every part, so that any repair shop, supplied fuel is of double importance, both on account of the satisfactory observation, even with a telescope of conabundance of our supply of this combustible and even 'siderable power. more on account of our paucity of coaling stations.

operations from the nearest coaling station.

A nation which possesses few of these must provide of the 30th in Cancer. Which shows Great Britain to possess a superiority in its ships with specially large bunker space, as in the case of the cruiser Columbia. Any device which will and apogee about the same hour of the night on the In the event of a war with that country, these are enlarge the fuel endurance of warships will be specially 19th. The moon is in perigee for a second time this valuable to the United States; and there is nothing in month on the evening of the 31st. sight to-day which would so effectually do this as the substitution of oil for coal in marine boilers.

> Speaking of the use of water tube boilers in the navy, Mr. Melville recognizes the necessity for a boiler lighter than the well known Scotch boiler; and while admitting that many types of the water tube system have proved successful on shore, he is of the opinion that no single type has yet made its appearance which tute for the Scotch pattern."

In view of the fact that the two cruisers Powerful and shippard working at full blast, it would take from for the English navy, are to be furnished with boilers seven to ten years to cancel that preponderance of of this type, the above statement by so distinguished an authority is significant. Mr. Melville evidently considers that for use in large ships the water tube boiler It is certain, moreover, that Great Britain would is yet in the experimental stage; and his opinion is steadily add to her fleets as the war progressed; and shared by many naval experts on the other side, who hours are required for it to regain its full brilliance. with her great shipbuilding facilities she could float strenuously opposed their adoption in these two costly Another minimum occurs on the 11th, at 9:23 P. M.

THE JANUARY SKY.

for observation. He rises now about 7 o'clock in the and it will probably increase in brilliance for about in from two to three years! To this must be added the stars is very interesting just now. On the first of the building capacity of the government dockyards January he is quite close to the fourth magnitude or a Leonis, by the moon, will occur about ten minand shops. The astounding resources revealed by this star & Cancri, and a little south of the Beehive clus-jutes before 11 o'clock P. M. on the 3d. investigation call for no elaboration on our part to ter in Cancer. Not only is a means thus offered by show that Great Britain could rapidly increase her which those unacquainted with the stars may, with preponderance of naval strength, if challenged to certainty, recognize this curious stellar region, but the picturesqueness of the view is increased, and a more The fact that European diplomats seem disposed to striking idea of the profundity of space may be formtake the British view of the question at issue makes ed when one sees the united light of hundreds of disit highly probable that, in the event of hostilities, we tant suns outshone by the reflected rays from a com-

Yet, although Jupiter may be called insignificant Incidentally, in closing, we would remark that the when compared with a sun, he is anything but insig-I were asked, "What is the most instructive sight that In making the foregoing comparison it is assumed the telescope reveals in the heavens?" I should be moon tracing out elliptical orbits so swiftly that a single evening's observation plainly reveals their change of place; one beholds eclipses with their mechanism displayed as the finest model could not do it; and the play of shadows on the face of another dusky poles; and the rapid turning of a vast world upon its axis of rotation.

In reference to this rotation, I may remark that now, is a steel cruiser of 3,189 tons displacement and 16.33 when the planet is visible the entire night, an excelknots speed. She carries two 8 inch guns, six 6 inch, lent opportunity is presented to see one complete turn two 6 pounder quick-fire guns, two 3 pounder quick- of Jupiter on his axis. Let the observation begin at 8 P. M. and end at 6 A. M. Between those hours the ob-It seems that, though her present engines are of an server will have seen all sides of the giant planet in rived in San Francisco a week ago, having ridden on horse power (her present horse power is 3,511), of the the time his eye was first applied to the tube. And in same type as that in the newly constructed Marble- the meantime he will have beheld many a scene that seventy-five miles a day. Some days they rode more head, the report states that we should "then possess has puzzled the astronomers, for the surface of Jupiter

would enable the ship to carry more coal; and it would of the month about 4 o'clock in the morning. At the They had very trying times on the windy prairies, give her 2 knots higher speed, equivalent to between end of January she will be in Sagittarius, rising about the sandy deserts, and the snow-covered mountains, 5:30 A. M. Her reign is passing and will not be re- and will not try to ride back again. They carried a sumed until she reappears in the sunset next autumn. I tent, blankets, cooking utensils, and also food on the

> too close to the sun to be observed, but about the 23d, lied for shelter and food on the farmers. when he is in the eastern part of Capricorn, he will be visible in the evening, more than 18 degrees east of the jized the purchase of 9,000 cycles which are to be sun.

Mars is in Ophiuchus, moving toward Sagittarius,

Saturn remains a few degrees east of α Libræ, rising

Uranus is in Libra, not very far east of Saturn, and

The moon is wauing when January opens, although at short notice.—N. Y. Sun.

by her coal capacity and the distance of her field of curs late in the afternoon of the 14th; first quarter on the evening of the 22d in Aries; full on the morning

Perigee occurs an hour before midnight on the 3d,

The lunar conjunctions with the planets occur as follows: Jupiter on the 2d just before midnight (the planet will be less than 2° south of the moon, a pretty sight); Saturn on the evening of the 9th, invisible; Uranus on the morning of the 10th; Venus on the morning of the 11th; Mars on the morning of the 12th; Mercury on the morning of the 16th, invisible; Neptune on the morning of the 26th, invisible; Jupiter (second time), before sunset on the 29th.

The wonderful variable star Algol, in Caput Medusæ, is now well situated for observation. It will be night. The observer should begin to watch it, using either the naked eye or an opera glass, early in the evening, noting the gradual diminution of its light as compared with the small stars near it. It remains at minimum but a few minutes, although three or four

The star Myra, in Cetus, which is as remarkable among long-period variables as Algol is among shortperiod ones, is now brightening. It began to be visi-Jupiter is still the only planet conveniently situated ble with a field glass about the middle of December,

An occultation of the first magnitude star Regulus,

The earth arrives at that point in its orbit which is nearest the sun at 1 o'clock on the afternoon of the 1st. GARRETT P. SERVISS.

TO READERS AND SUBSCRIBERS.

The present number of the SCIENTIFIC AMERICAN brings to a close the labors of the year, and the next issue opens a new volume, a fresh page in the history of our work. To our many readers and friends, in all parts of the world, we offer hearty thanks for their generous support in the past, and we hope to merit the continuance thereof by faithful endeavors in the future.

The commencement of the year is the time when nearly all subscriptions fall due, and we trust our subscribers will be prompt in forwarding their remittances, thus avoiding the loss of numbers by the crossing off of their names. We earnestly hope they will send us, along with their own dues, the additional subscription of some friend or neighbor.

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Cycle Notes.

Two bicyclists, Theodore and Eddie Kraguess, arrode it in thirty-eight days, an average rate of and some less, and occasionally they rode until nearly midnight in order to keep up the average. They did machinery would weigh 142 tons less than the old; it Venus is in Libra near Scorpio, and rises on the 1st not make the trip for money or glory, but for pleasure. Mercury is in Sagittarius at the opening of the month, long desert stretches, although in the main they re-

> It is said the Bavarian Minister of War has authorused for the infantry and sharpshooters,

> A proposition has been made recently by bicycle riders to several agents and manufacturers of bicycles that the manufacturers get together in a convention and agree to reduce numerous parts of their different

> In some respects the makers have been obliged rims and tires. There is no reason why a similar agreement should not be reached regarding the fittings of with a reasonable quantity of standard repair parts, should be able to put any make of machine in order