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# ENGINES AND BOILERS OF THE "DEUTSCHLAND."

THE "Deutschland," the new vessel of the Hamburg-American line, was built by the Stettiner Maschinenbau Actien-Gesellschaft "Vulcan" at Bredow, near Stettin, where also the North German Lloyd steamer "Kaiser Wilhelm der Grosse" was constructed and engined. The "Deutschland" equipped with engines of 33,000 indicated horse power, which is the greatest power ever fitted in any ship up to the present time. The vessel is 662 feet 9 inches long, and has a displacement of 23,000 tons, and it is expected she will leave on her first voyage to New York on June 17. While the "Dentsch-hand" is 662 feet 9 inches long between perpendiculars and 686 feet over all, it is 38 feet longer than the "Kaiser Wil-helm der Grosse," the beam of the former being 67 feet, or one foot more than the latter. The molded depth is 44 feet, one foot greater than the "Kaiser Wilhelm der Grosse." The gross tonnage is 16,000 and the displacement 23,000 tons. In general appearance the vessel resembles the "Kaiser Wilhelm der Grosse," but the internal arrangements differ. The "Deutschland" has six cylinder quadruple expansion engines, as shown in our engraving. The illustration does not show the two high pressure cylinders in each set of engines. They are to be above the low pressure cylinders and work tandem, and their position is in-



ONE OF THE BOILERS OF THE "DEUTSCHLAND." DIAMETER, 16:16 FEET.

dicated by the beds cast on the cylinder tops. The erecting shop at the Vulcan Works, while very high, did not permit of placing these cylinders in position by overhead eranes.

The two low pressure cylinders are in the center, with the two high pressure cylinders over them, and at the forward end is the first intermediate and at the after end the second intermediate. The first two cranks, set opposite each other, have thus the intermediate in the one case, and a high pressure or low pressure cylinder in the other, and the after pair of cranks, a high pressure and a low pressure in the one case, and the intermediate on the other crank. The cylinders are placed close together, the valves being on the outside. There is a separate valve gear for each cylinder, that is to say, six sets for the six cylinders of each engine. The end cylinders have their valves boxed on the outside. The common stroke of the engine is 72.8 inches. The two low pressure cylinders are 106 inches in diameter and the intermediate pressure cylinders are 73.6 inches and 103.9 inches. The two high pressure cylinders have a diameter of 30.6 inches. The engines indicate 33,000 horse power when running at 76 revolutions per minute. Steam is furnished by twelve double-ended and four single-ended boilers divided equally into four sets of four boiler compartments. The working pressure is 225 pounds. The total heating surface is 85,434 square feet.



# SCIENTIFIC AMERICAN SUPPLEMENT, No. 1273.

THE SILVER INTENSIFIER.

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Below we 1 also suite.

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1 30 minims of common in a pint of ance. This six months. up, and in 5 per cent.

TIONS. ounce.

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loper, For 0. 2, and 40

with water. No. 1, and reduce Nos.

grains.

ounces. grains. ounces. grains.

ounces. No. 2, and

can be used for bromide

grains. ounce. grains.

ounces.

To make solution No. 2 dissolve the silver in half the water and the cyanide in the remainder; add the latter to the silver, gradually shaking between each addition until the white precipitate first formed is nearly all redissolved, and then make the total bulk to 10 ounces.

Label: Poison. The negative must be thoroughly freed from hypo, and then immersed in No. 1 till bleached right through, then well wash and immerse in No. 2 till blackened, and again wash.

ONE SOLUTION REDUCER.

Sodium sulphite			 .180	grains
Potassium ferric	oxal	ate	 . 1/2	ounce
Distilled water to			 . 10	

Dissolve and add

Oxalic acid (crystals)..... 80 grains.

Shake till the solution turns green, then pour off from any undissolved acid and add

Sodium hyposulphite...... 2½ ounces. Water, q. s. to make..... 20 " in all.

Label: Immerse the negative in the solution and remove just before the desired reduction is obtained, and then wash thoroughly. This solution must be kept in the dark, and can be repeatedly used, or until it turns yellow.

ONE SOLUTION REDUCER.

Potassiu	m iodio	le,	 .,	 • •		• •		• •	,40	grains.
Sodium	hyposu	lphite	 • •	 	٠,•	.,	۰.	2.	. 2	ounces.
Distilled	water	to	 • •	 ••		• •	1	••	.10	

Label: This reducer acts slowly, and may be used for plates and papers. After use the negative should be well washed.

#### ORDINARY NEGATIVE VARNISH,

Gum sandarac	 1	ounce.
Orange shellac	 	**
Castor oil	 	minims.
Methyl alcohol	 	pint.

Allow to stand with occasional agitation till dissolved, and then filter. Label: The negative should be heated before a fire till it can be comfortably borne on the back of the hand, and then the varnish flowed over, any excess being drained off, and the negative should then be again placed near the fire to dry.

SULPHOCYANIDE TONING BATH (CONCENTRATED).

	Potassium sulphocyanide.	1 ounce.	
1	Chloride of gold		
	Distilled water to		

Dissolve the sulphocyanide in half the water and the gold in the remainder. Mix the two solutions. Label: This solution must be kept in the dark. Every 2 drachus of this bath contains 1 grain of gold DEAD BLACK VARNISH.

Borax Shellac.	•	•	•		•	•	 •	•	•		•	•	•	•	•	•		•	•	•	30	grains.	
Glycerin									1	÷				i.					ľ		30	minims.	
Water.		2		,		•		.,	è.	,		,			•	2	3		 		2	ounces.	

Boil till dissolved, filter, and add aniline black 120 grains.

Label: Apply the solution with a brush, and repeat when dry if necessary.

COMBINED TONING AND FIXING BATH.

Sodium hyposulphite 4	ounces.	
Ammonium sulphocyanide	44	
Lead nitrate100	grains.	
Alum		
Distilled water to 10	ounces.	

Dissolve the hypo. and sulphocyanide in 8 ounces of the water, then add the alum dissolved in 1 ounce of water, and then the lead dissolved in 1 ounce of water, boil for ten minutes, allow to cool and filter, then add 7½ grains of chloride of gold. Label: Mix the requisite quantity with an equal quantity of water. The prints should be rinsed in water for five minutes beforetoning.—Pharm. Jour.

## GLASS BEAD MANUFACTURE AT VENICE.

THERE are more than 3,000 men employed in this industry. Formerly Venice was the only place where beads were made. It was asserted that there was no possibility of making them elsewhere owing to some climatic influence, and the chemical composition of the local sweet and salt sands. Manufactories, however, now exist in France, Bohemia and Antwerp. Some years ago a factory was also opened in India. The exportation in 1898 was 639 tons, of the total value of £144,362.

The process of making glass beads is as follows: 1. The vitreous paste is composed, and is then fused in the furnace. 2. The "canna," or long, thin, perforated tube, is made by the "Margaritai" for producing the round small globes of glass of different colors, or imitation of pearls, coral, and precious stones. 3. The rounding and working of glass pearls is done at the flame of a lamp. The first operation is considered the most important, as it provides the material necessary for making all kinds of beads, and requires some technical knowledge, and great practice, as the preparation and composition of the various pastes are still jealously kept secret.

It may, perhaps, be of interest to know something of a bead factory. The furnace contains five or six large earthen vases, divided one from the other, so that they may be differently heated, according to the various compositions which are poured into them. The operations for making the "canna farata," or long hollow tubes, to be converted into beads, and the "canna massiccia," to be reduced into pearls, are these: the vitreous paste is reduced into pearls, are these: the vitreous paste is reduced into long glass tubes, more or less thin, according to the different thickness of the beads to be made, but in such a way that the hole in the middle of the tube is always maintained. The work is executed by the foreman, who has under his orders two assistants and four workmen, called " tiradori." One of the assistants dips the end of an iron rod, about 4 feet long, into one of the vases containing –

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then be again placed near the fire to dry.

SULPHOCYANIDE TONING BATH (CONCENTRATED).

Potassium sulphocyanide.	1 ounce.
Chloride of gold	
Distilled water to	

Dissolve the sulphocyanide in half the water and the gold in the remainder. Mix the two solutions.

Label: This solution must be kept in the dark. Every 2 drachms of this bath contains 1 grain of gold and should be diluted with 8 'ounces of water to make a normal bath that will tone about 340 square inches (equal to about twelve half plates) of P. O. P. to a warm purple. The more prints the browner the tone,

#### , CONCENTRATED PLATINUM TONER.

Label: Keep in the dark. Dilute ½ ounce with ½ pint of water. Innerse the prints in a 5 per cent. solution of salt and water for five minutes; wash for five minutes, and immerse in the toning bath, and then wash thoroughly and fix in

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Sodium sulphite					ζ,				1				**		
Sodium carbonate	1			 			÷			1/2			"		
Water		-	3.					 •	30	1			**	1.1.	

For black tones omit the salt bath, wash the prints for fifteen minutes, tone till brown in a borax gold bath, wash well, and then tone in the platinum bath and fix as directed above.

#### URANIUM INTENSIFIER.

Potassium ferricyanide (washed)48	grains.
Uranium nitrate	17. <b>1</b> . 10. 12.
Sodium acetate	2 . M. 1 . 2.5
Glacial acetic acid 1	ounce.
Distilled water to10	63 <b></b> 649

Label: Poison. Immerse the well washed negative till the desired intensification is reached, rinse for five minutes and dry. This intensifier acts very strongly and should not therefore be allowed to act too long.

#### COLD VARNISH.

Pyroxylin			,			 		1						i.	10	grai	ns.	ŝ
Amyl alcohol	•	•				•			•	-					1	oun	ce.	
Amyl acetate					١.					ć					1		1.	

Allow to stand, shaking frequently till dissolved. Label: The negative should be thoroughly dry before this solution is applied, which may be done either by flowing it over the solution or with a flat brush. The negative should be placed in a warm place for at least twelve hours to thoroughly dry.

#### ANOTHER COLD VARNISH,

Japanese gold size, -

#### Benzole......equal parts.

Label: In applying this varnish great care should be taken not to use it near a light or open fire. It can be flowed over or brushed on the negative.

#### BLACK VARNISH.

Brunswick	black	 	ounces.
Benzole		 	

Label: The varnish should be applied with a brush, care being taken not to use it near a light or open fire.

tions for making the canna mana tubes, to be converted into beads, and the"" canna massiccia," to be reduced into pearls, are these : the vitreous paste is reduced into long glass tubes, more or less thin, according to the different thickness of the beads to be made, but in such a way that the hole in the middle of the tube is always maintained. The work is executed by the foreman, who has under his orders two assistants and four workmen, called "tiradori." One of the assistants dips the end of an iron rod, about 4 feet long, into one of the vases containing the molten paste of the required color. He then rolls it on an iron table to reduce it in a cylindrical form, and makes a round hole on the upper part of the paste. After this the foreman takes the rod in his hand and heats in the furnace the portion of paste attached to its end by giving it a few turns, and sees that the hole made is exactly in the center. He then promptly attaches another rod to the upper part of the paste. The two rods are at once delivered to two "tiradori," who, running speedily in two opposite directions, reduce the molten material into a very long thin tube, which preserves the hole in its center for all its length. The glass tubes are then divided according to their thickness, and cut in small pieces. Such pieces are then sifted and put in iron tubes with sand and coal powder, and by turning them in the furnace the pieces are made round. The pearls are then polished by placing them in a bag containing some sand and shaking them for some time. They are then separated from the sand by a sieve and put in another bag containing a portion of white bran, and again shaken, when they become extremely brilliant, and, after being sifted, are ready for sale.-Foreign Office Annual Series.

# BRONZE PRINTING.

ALL classes of textile fabrics may be printed with metallic powders for decorative purposes.

Two methods of application are in use for thin goods, the ordinary cylinder machine is employed, while for thick, rough, or pile fabrics, the "Perrotine," or even hand-blocks are used.

The vehicle must be one that will so fix the powders to the material that even brushing will not remove them, also their brilliancy must not be destroyed.

them, also their brilliancy must not be destroyed. Two classes of "fixers," or vehicles, are at present employed in the trade: egg or blood albumin, and various varnishes having caoutchouc as their base. As an example of the former, the following mixture may be cited : ½ gallon of gum tragacanth paste (65:1,000) and 1¼ gallons of egg albumin solution (1:1) are, when thoroughly mixed, incorporated with 8 pounds of the metallic powder, giving a total volume of nearly 2 gallons. The gum tragacanth paste and the egg albumin solution are prepared in the usual way by allowing the dry materials to soak in cold water, etc.

In using the above mixture on the cylinder machine, a lap apron is employed to furnish the color from the box to the printing roller, while for block printing, the ordinary pad suffices. This method will not answer for pile fabrics, especially if they be of silk. Before printing, the goods are slightly damped so that the paste has a better ground to hold on, and after printing they are dried without the application of heat and steamed for 15 to 20 minutes. If the fabric has been previously dyed, as is generally the case, it should be well washed before printing, which is the last operation. The paste has no effect on the dyestuffs.

The rubber paste is made from pure unvulcanized India-rubber, as the sulphur in the vulcanized rubber would injure the color of the metallic powders. The

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#### 14 14 A.M. .

#### SIFIER.

# grains.

# ounces.

## well washed n rinse well negative in n refix; the

in the solu-