

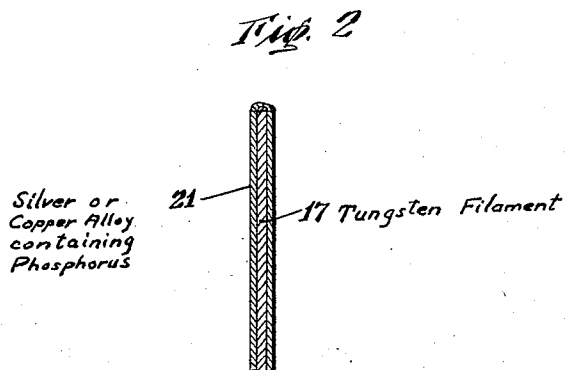
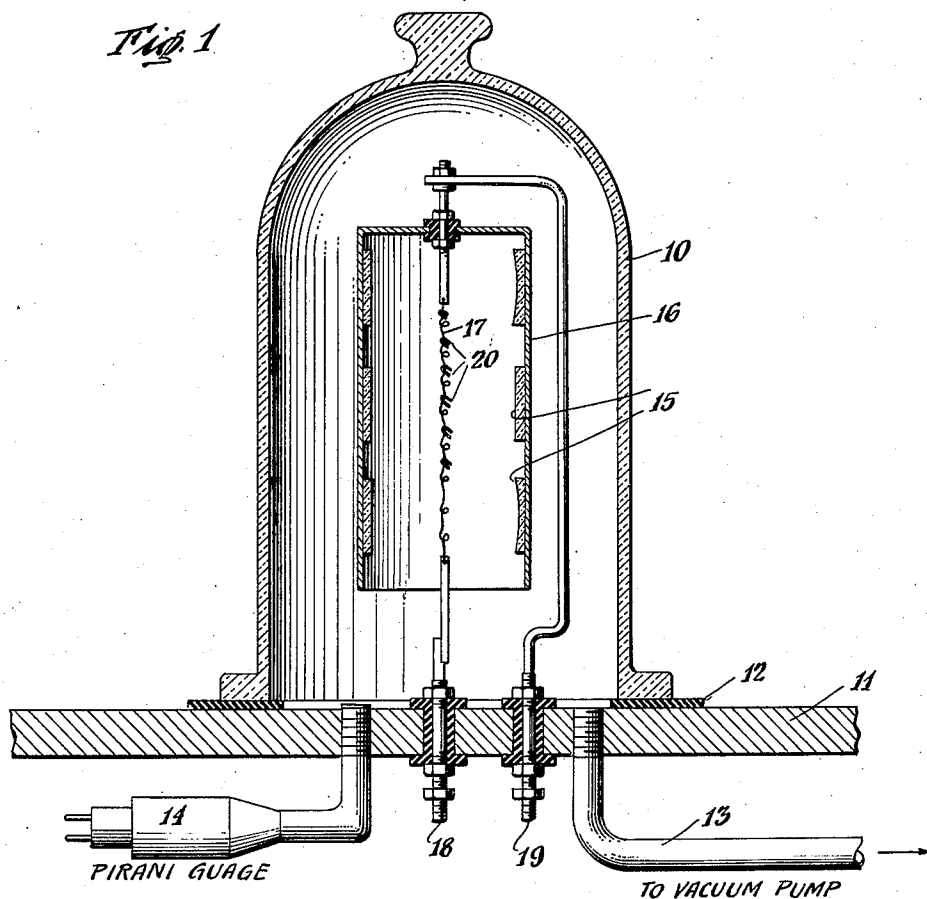
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2,450,340

SILVER BASE ALLOY FOR METAL EVAPORATION

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SILVER BASE ALLOY FOR METAL EVAPORATION

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1 Claim. (Cl. 75-173)

This invention relates to improvements in metal evaporation.

An object of the invention is to improve the evaporation of silver and copper and their alloys.

Other objects of the invention will be apparent from the description and claim.

Figure 1 is a sectional elevation of a metal evaporation apparatus, and

Figure 2 is a fragmentary cross-section of the tungsten filament coated with the metal to be evaporated.

The vaporization process for depositing silver, copper and other metals has been known for some time and used commercially to some extent. The processing as applied to silver is described in considerable detail in the book "Silver in Industry" edited by Lawrence Addicks (Reinhold 1940) pages 291 to 296.

In carrying out the process the metal to be evaporated is usually hung on a tungsten filament as small loops of wire. Electric current is then passed through the filament to heat it and the wire loops are melted and the fused metal clings to the filament and evaporates as the heating is continued. One difficulty which has been encountered with silver and copper has been the failure of these metals to wet the tungsten sufficiently to cling to it during the vaporization process. The metal tends to ball up and drop off the filament before it can be evaporated. It also sometimes tends to spatter during evaporation, probably due to the accumulation of the liquid metal in large globules.

We have now discovered that this difficulty can be overcome and satisfactory wetting of the tungsten filament obtained by adding a small percentage of phosphorus to the silver or copper or their alloys. For example, an alloy of

	Per cent
Phosphorus	.04
Platinum	4.97
Silver	Balance

was found to wet the tungsten extremely well and to give no spattering during evaporation while a similar alloy without the phosphorus content was found to operate erratically.

In general the amount of phosphorus which should be alloyed with the silver may fall within the range of .001 to 1%. Other alloying ingredients may be present in the silver. Platinum and palladium in proportions ranging from .25 to 20% are sometimes desirable for improving the wettability still further. In some cases nickel, cobalt or iron may be present in percentages ranging from .001 to .5%.

For copper and copper alloys similar percentages of phosphorus may be used and similar addition metals if desired.

Referring to the drawing, Figure 1 shows a metal vaporization apparatus comprising a bell jar 10 resting on a pump plate 11 with a rubber gasket 12 between them to afford a gas seal. The bell jar is connected to a vacuum pump through pipe 13 and a Pirani gauge 14 may be provided to measure the degree of vacuum obtained.

The articles to be coated with a thin film of silver or copper such as glass plates or mirror blanks 15 are mounted on the inside wall of a cylindrical container 16 supported within the bell jar. The tungsten filament 17 is mounted axially within the container and connected to insulated terminals 18 and 19.

The silver or copper alloy to be evaporated is hung on the spiral tungsten filament as little wire loops 20 so that when the filament heats up the loops will melt and cling to the filament.

Figure 2 is a fragmentary cross-section of the tungsten filament 17 coated with the fused alloy 21 of silver or copper preparatory to evaporation.

While specific embodiments of the invention have been described, it is intended to cover the invention broadly within the spirit and scope of the appended claim.

What is claimed is:

An alloy wire for metal evaporation composed of about .04% phosphorus, 5% platinum and the balance of silver.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,652,107	Escholtz	Dec. 6, 1927
2,019,984	Leach	Nov. 5, 1935
2,160,714	Briggs	May 30, 1939
2,162,627	MacGregor	June 13, 1939
2,166,248	Hensel et al.	July 18, 1939
2,196,306	Hensel et al.	Apr. 9, 1940
2,259,668	Spanner	Oct. 21, 1941

FOREIGN PATENTS

Number	Country	Date
755,701	France	Sept. 11, 1933
452,401	Great Britain	Aug. 21, 1936