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## DRAWING COMPOUND AND THE LIKE

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The present invention relates to treating metals and to drawing compounds for such treatment. It provides an improved composition of those compounds which are used as lubricants in deforming metals, as in drawing and stamping operations.

In those mechanical operations which necessitate the subjection of metal to the action of a die it is necessary to provide a lubricant between the metal and the die. The primary purpose of the lubricant is to protect the die from wear and thus to preserve its design and to prolong its life. Another reason for the use of a lubricant is to preserve the finish or surface, and even the body, of the work-piece. The most important feature taken into consideration when a lubricant is chosen is the preservation of the die. The dies are in many instances very expensive and are necessarily of accurate dimensions. Any wear which takes place will naturally take place at the points receiving the greatest pressures. Such pressures tend to drive the lubricant out of the interfacial space, and when this is done the metal work-piece is exposed to tear and the die to wear.

In the choice of lubricants the lubricating power is of prime importance. Next comes the covering power of the material, by which I mean the power of the material to resist the squeezing-out action of the die and the work, or its resistance to segregation. Aside from these essential considerations there are ancillary ones which relate to the composition of the material employed, and the effect of the composition on the subsequent treatment or disposition of the drawn or stamped work.

Metal parts which have passed through the drawing or stamping operations are frequently set aside for a period of time during which rusting might occur but for the fact that the lubricant is retained on the work. It is therefore necessary in such a case to use a lubricant which will protect the work as distinguished from one which will not and which may even corrode the metal.

Still another consideration is the removal of the lubricating material from the work. As a rule, a chemical bath is employed which has the proper selective action between the lubricant and the work, such as a 2% or 3% solution of caustic potash or soda. The superior lubricant is therefore one which meets all the foregoing considerations and which can be readily removed from the work.

Lubricants which are commonly used in the art comprise oils, fats, etc., in various combinations. Mineral oils or greases are by far the cheapest constituent, and heavy lubricating oil alone is useful. Certain animal and vegetable oils or fats are sometimes used as lubricants or are incorporated into them, but they are rather expensive in comparison with the mineral greases. Animal and vegetable fats and oils are subject to becoming rancid and the formation of acid by such a process increases the tendency toward corrosion if it does not actually produce corrosion.

The common method of removing such mineral, animal or vegetable materials, used either alone or in combination, is to place the grease covered article in an alkaline bath. The mineral oils can thus be emulsified and removed. However, some mineral greases are very slow to emulsify, so that the cleaning action is prolonged. The animal fats and oils on the other hand will both saponify and emulsify, and these are more readily removed from the work in a quicker cleaning operation.

Aside from the various oily and greasy substances of which drawing compounds are made up, there is sometimes used a small quantity of finely divided and well dispersed solid material such as keiselguhr. The solid matter increases the covering power of the lubricant by preventing its flowing away from the points where it is most desired to lubricate the die.

The present invention aims to provide a new composition of lubricant which meets all the foregoing considerations; which permits a reduction in the proportion of animal fat or vegetable fat and even the elimination of them; which imparts greater covering power to the lubricant; which eliminates danger of acid forming ingredients, thereby providing a corrosion-preventing lubricant and

a preservative; and which permits the compound to be readily cleaned in the usual bath in a much shorter time than heretofore.

In other words, one object of the invention is to provide the compound with an ingredient which acts to increase the covering power of the grease composition, which is harmless to the work on long standing in contact with the lubricant, and which is effective in the cleaning operation to aid in the removal of the compound.

More specifically, it is an object of the invention to incorporate in ordinary compounds a soft solid substance which is reactive with a suitable material in a cleaning bath to loosen the compound from the work.

In the following description of the invention I have set forth what I consider to be the most practical embodiment of the idea, that is, one which comprises the addition of but a single cheap substance to ordinary compounds, so that they may be used in the ordinary way and cleaned in the ordinary cleaning baths. But it will be understood that the examples hereinafter given are by no means the only applications of the invention, and that the specific compositions hereinafter mentioned are not to be considered as limitations of the invention short of the scope of the appended claims.

As previously stated, common lubricants are richer in mineral greases than in vegetable ones and others such as animal fats, primarily because of the lower cost for the mineral ingredient. The covering power in compounds higher in mineral ingredients is not so great as in compounds having animal fat as the basis, and the emulsification of the high mineral grease compounds is much slower in the cleaning operation. To a compound which contains 97 parts of heavy mineral oil, such as lubricating oil, and about 3 parts of animal or vegetable fat, such as red oil (oleic acid), I have added 1% of aluminum dust as an example of the new composition. Brass waffle iron tops drawn with this compound clean very much quicker than similar plates drawn with the same composition having no aluminum present. The plates could be inserted in the cleaning bath and withdrawn almost immediately. A very rapid evolution of hydrogen gas takes place by the reaction of the aluminum and the caustic alkali, which gas is effective in forcing the lubricant away from the metal and in rendering it more readily emulsified. The increased rate of emulsification permits withdrawal of the plate from the bath with much less danger of the plate gathering oil or grease as it is withdrawn from the bath. In this particular instance aluminum is the preferable metal to be used because it forms an alkali aluminate, characterized by the property of preventing brass, and some other metals, from tarnishing. Aluminum is also particularly beneficial because it acts mechanically as a lubricant of the order of powdered graphite.

The finer the aluminum powder, or other metal, such as zinc dust, which is used in the new compound, the greater its benefits. The covering power is made greater with increasing fineness. The smaller the particles of the metal, the more accurately the work piece conforms to the dimensions of the die. In the cleaning operation, the finer particles will be more widely distributed, offering a greater surface for a quicker action in the generation of hydrogen. As to fineness, there is no particular criterion; and I have found that the aluminum powder that is used as commercial aluminum bronze paint is satisfactory, and that a finer powder is better. A colloidal distribution of the aluminum or other solid is of course comprehended within the scope of the present invention.

A heavy hydrocarbon lubricating oil without admixture of other greases can likewise be used in compositions of the present invention, it being only necessary to add about 1% of the solid, such as aluminum dust, or zinc dust, when an alkaline bath is contemplated, or a sufficient quantity of other material when other types of baths are contemplated. In using the aluminum dust, I have found that it is not necessary to have present any material such as kieselguhr, as the metal particles provide the immobile nuclei which retard the oil in its flow from the space between the die and the work piece.

A low grade of mutton tallow may be used as an example of a drawing compound of a different type. Proper admixture of the metal powder, zinc or aluminum for an alkaline bath, is essential to the making of the new compound. Other compounds in which soaps are used, or any other common ingredients, are not excluded from the compositions which may be taken as a base for the new composition of the present invention.

The fact that the lubricant is assured to function, because of the presence of the new solid ingredient makes the new composition valuable as a contribution to the life of the die. The solid prevents segregation of the lubricant film during the operation and thereby avoids the possibility of tearing the metal and of wearing the die. This saves time and material. The further saving of time in the cleaning operation is also pertinent to its advantages. Besides all the foregoing positive advantages, there are the incidentally allowable alterations in composition of otherwise preferred mixtures towards a higher proportion of the cheaper mineral ingredient, and towards a lower proportion of the more expensive animal or vegetable greases. And when the animal or vegetable fat (which is so much more easily emulsified and is saponified by the alkaline bath) is entirely eliminated there is an increased protection

guaranteed against rusting or corrosion of the metal when the compound is left in contact with the work for a considerable length of time.

As an example of other and different materials which may be incorporated in the compounds of the invention I cite calcium carbide, a solid which reacts with water to generate acetylene gas. This material has been incorporated in powdered form into a mixture of equal parts petrolatum and soft tallow. It must be very finely ground in order that it may be properly suspended and the fine grinding minimizes what abrasive properties it may exhibit. Compared to aluminum dust, it is more inclined to settle out. Ordinary water is not a suitable cleaning bath, in spite of the fact that it reacts with the calcium carbide. It is necessary to have in the water some material which will attack the grease and expose the carbide to the action of the water. Alkali is suitable for this purpose. In this particular instance, therefore, the alkali solution is a suitable cleaning bath of which the water is the essential reagent for the carbide.

It is therefore to be understood that the present invention is not necessarily limited to the use of a material which reacts with alkalis, and that various changes may be made in both the bath and in the composition of the compound, which changes however should be consistent with the results desired. Nor is it to be considered that the invention requires a solid capable of functioning to increase the covering power. However, when a solid material such as aluminum or zinc powder, or even a mixture of them, is employed in contemplation of cleaning with an alkaline bath, it is to be observed that the metal performs one function because of its existence as a solid in the drawing operation, and another function because of its reactive qualities in the cleaning operation.

I claim:

1. A drawing compound and the like containing essentially lubricating grease and a small percentage of well dispersed soft metal capable of reaction to form gas in an alkaline cleaning bath.

2. A drawing compound and the like containing essentially lubricating grease and a small percentage of well dispersed aluminum powder.

3. A drawing compound and the like containing essentially lubricating grease and about one percent of well dispersed aluminum.

4. A drawing compound and the like containing essentially a non-corrosive lubricant and a small percentage of a well dispersed soft metal capable of reaction to form gas in an alkaline cleaning bath.

5. A drawing compound and the like containing essentially a mineral hydrocarbon lubricant and a small percentage of a well dispersed soft metal capable of reaction in an alkaline bath to form a gas.

6. A drawing compound and the like containing essentially a mineral hydrocarbon lubricant and a small percentage of a well dispersed aluminum powder.

7. A drawing compound and the like containing essentially a lubricating grease in which a mineral lubricating constituent predominates and a small percentage of a well dispersed material capable of reaction in an alkaline cleaning bath to form a gas.

8. A drawing compound and the like containing essentially a lubricating grease in which a mineral lubricating constituent predominates and a small percentage of a well dispersed soft metal powder capable of reaction in an alkaline cleaning bath to form a gas.

9. A drawing compound and the like containing essentially a lubricating grease in which the mineral constituent predominates and a small percentage of well dispersed aluminum.

10. A drawing compound comprising about 97 parts of mineral lubricant, about 3 parts of vegetable lubricant, and about 1 part of finely divided solid material capable of liberating gas in an alkaline cleaning bath.

11. A drawing compound comprising about 97 parts of mineral lubricant, about 3 parts of vegetable lubricant, and about 1 part of metal powder capable of liberating gas in an alkaline cleaning bath.

In testimony whereof I have hereunto affixed my signature.

CYRIL KOCOUR.