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LUBRICANT

Alfred H. Kelling, Chicago, Ill., assignor to International Patents Development Company, Wilmington, Del., a corporation of Delaware

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This invention relates to a lubricant for use particularly in die pressing sheet metal articles or other similar operations.

One of the objects of the invention is to provide a lubricant of suitable character and consistency for operations of the sort which will not dry out but will remain soft for a considerable period of time, so that the lubricant used for one operation need not be removed before the article is subjected to a subsequent operation or operations.

Another object of the invention is to provide a lubricant, suitable for operations of the character indicated, which will be water soluble, so that the lubricant may be ultimately removed from the article by a mere washing operation.

A starch sugar solution in which the conversion has been carried to the so-called glucose stage, that is, to a stage at which the unconverted substances inhibit the crystallization of the dextrose—such product, when concentrated, being a relatively permanent syrup of viscous character—has been found to have the proper consistency for use as a lubricant in the die pressing; for example, in the die pressing of relatively large sheet metal articles such as the fenders and other parts of automobile bodies. However, it is not practical, under ordinary circumstances, to use this substance for this purpose because it dries too rapidly and has to be washed off the article between die pressing operations in order to prevent the film of dried material from marring the surface of the steel in later pressing operations.

It has been discovered, however, and this is the basis of the present invention, that this defect may be obviated by incorporating with the "glucose" (partially converted and concentrated starch solution) a deliquescent or hygroscopic substance non-reactive with the carbohydrate ingredient of the compound and with the metal to be treated which will inhibit the drying of the lubricant when exposed to the atmosphere on the blank or article. A suitable and preferred agent for this purpose is glycerine. Other hygroscopic substances such as calcium chloride may be used; although with ordinary steel articles the use of calcium chloride is undesirable because of the possibility of corrosion.

In place of glucose it is possible to use hydrol, that is the mother liquor from the manufacture of crystalline starch sugars, provided the dextrose content has been sufficiently reduced to make the solution non-crystallizing. Or one could use molasses from the manufacture of cane or beet sugar. Water soluble and non-crystallizing carbo-hydrate substances are particularly suitable because of their lubricating and viscous character when in concentrated solution. Commercial glucose, for example, provides for a certain degree of slip between the sheet metal and the dies while at the same time insuring enough of a grip of the dies on the blank to bring about the desired drawing effect under the die pressure.

When glucose is used for the body of the lubricant (and by glucose is meant a startch converted solution of non-crystallizing character, for example a solution containing approximately 30% to 45% of reducing sugars calculated as dextrose on dry basis) the glucose is preferably concentrated to about 42° Baumé—although the concentration may vary from 36° Baumé to 45° Baumé, more or less—and to the glucose is added from 16% to 20% of glycerine, by weight calculated on the glucose.

It will be understood that the viscosity of the glucose, or other body substance of the lubricant, may require variation in accordance with the particular pressing operations for which the lubricant is used. The viscosity of the glucose will be increased by increasing its concentration. Generally speaking, the larger the glucose content of the lubricant solution, the larger should be the quantity of hygroscopic substance employed for preventing the drying out of the material.

I claim:

1. A metal drawing lubricant consisting of a viscous, non-crystallizing water solution of a soluble carbohydrate substance, and a sufficient amount of a hygroscopic substance, non-reactive with the carbohydrate and with the metal to be treated, to inhibit drying on exposure of the lubricant to the atmosphere.

2. A metal drawing lubricant consisting of a viscous, non-crystallizing water solution of a soluble sugar containing carbohydrate substance, and a sufficient amount of a hydroscopic substance, non-reactive with the carbohydrate and with the metal to be treated, to inhibit drying on exposure of the lubricant to the atmosphere.

3. A metal drawing lubricant consisting of a viscous, non-crystallizing starch syrup and a sufficient amount of a hygroscopic substance, non-reactive with the starch syrup and with the metal to be treated, to inhibit drying on exposure of the lubricant to the atmosphere.

4. A metal drawing lubricant consisting of a viscous starch syrup converted to a non-crystal-

lizing stage and a sufficient amount of a hygroscopic substance, non-reactive with the starch syrup and with the metal to be treated, to inhibit drying on exposure of the lubricant to the atmosphere.

5. A metal drawing lubricant consisting of a viscous starch syrup converted to the glucose stage and a sufficient amount of a hygroscopic substance, non-reactive with the starch syrup and with the metal to be treated, to inhibit drying on exposure of the lubricant to the atmosphere.

6. A metal drawing lubricant consisting of a starch syrup converted to the glucose stage, at a concentration between 36° and 45° Baumé, and a sufficient amount of a hygroscopic substance, non-reactive with the starch syrup and with the metal to be treated, to inhibit drying on exposure of the lubricant to the atmosphere.

7. A lubricant consisting of a viscous water solution of a non-crystallizing carbohydrate substance, and a sufficient amount of glycerine to inhibit drying on exposure of the lubricant to the atmosphere.

8. A lubricant consisting of a viscous starch syrup converted to substantially the glucose stage and glycerine.

9. A lubricant consisting of a starch syrup converted to the glucose stage, and having a concentration of between 36° and 45° Baumé and glycerine.

10. A lubricant consisting of a starch syrup converted to the glucose stage, having a concentration between 36° and 45° Baumé and containing from 5% to 50% of glycerine.

11. A lubricant consisting of a starch syrup converted to the glucose stage, at a concentration of approximately 42° Baumé and containing from 16% to 20% of glycerine.

ALFRED H. KELLING.