

UNITED STATES PATENT OFFICE

2,613,626

METHOD OF COLD DRAWING SHEET METAL

Forrest Jerome Whitney, Jr., Wayne, Pa., assignor
to Heintz Manufacturing Company, Philadel-
phia, Pa., a corporation of Pennsylvania

No Drawing. Application July 21, 1948,
Serial No. 40,001

2 Claims. (Cl. 113—51)

1

This invention relates to a method of facilitat-
ing the drawing of metal sheets.

An object of the invention is to provide an im-
proved method of cold working metal sheets
which has the advantages of permitting faster
operation of the metal working machinery, de-
creasing the number of imperfect articles made
in the metal working process, and decreasing the
number of delays occasioned by stoning the parts
of the metal working machinery, such as dies and
the like.

An example of the application of this invention
is in the drawing of a metal tub by use of hard-
ened steel dies, the final product having a diam-
eter of around 25 inches and a depth of about 24
inches, and formed from a circular flat sheet of
steel (for example of type A1S1 Specification
C1008) having a gauge of approximately .062.

Before putting the steel sheets through the
drawing operations, a quantity of sheets to be
coated are first washed in an alkaline bath to
accomplish degreasing, after which they are
rinsed in cold running water. The blanks are
thereafter immersed in a bath having the follow-
ing chemical composition:

	Grams per liter
Zinc	11.0
P ₂ O ₅	9 to 9.5
NO ₃	18
Na ₂ O	1.5
Ni	0.1
Cu	0.03
NaNO ₂	1 to 1.5

The above bath is preferably used at a pH of
2.8 to 2.9, and at a temperature of 20 to 25° C.,
with an immersion time of 3 to 5 minutes.

After treatment in the bath, the blanks are
rinsed in cold running water and dried. The
blanks after this treatment have a thin coating
of zinc phosphate tightly adherent chemically to
their surfaces.

After the phosphate coating operation, the
coated blanks are put through three drawing op-
erations, before each of which drawing operations
the blanks are dipped or coated by swabbing, with
a lubricant. Various types of lubricants are used,
and among the most desirable are the following:

1. 1% sodium soap—99% water.
2. 2% sulphonated tallow—98% water, with
enough sodium hydroxide to produce a pH value
of 8.

2

3. 1% chlorinated paraffin, forming an emul-
sion with 2% sodium soap, using 97% water.

The lubricating solutions set forth above are
used in conjunction with the following lubricants,
one of which is a pigmented type of composition,
and the other of which is non-pigmented, the
two compositions following being used to adjust
the lubricating conditions by addition to which-
ever of the three above-listed lubricants is being
used.

Non-pigmented

- 24% animal fatty acid (lard, oil, or degreas)
- 24% vegetable fatty acid (soy bean fatty acid)
- 6% solid alkali (NaOH)
- 10% chlorinated wax
- Balance water.

Pigmented

- 24% animal fatty acid (lard, oil, or degreas)
- 24% vegetable fatty acid (soy bean fatty acid)
- 6% solid alkali (NaOH)
- 10% chlorinated wax
- 20% pigment (talc, or inert clay)
- Balance water.

The two lubricants just described are used to
adjust the lubricating conditions, the non-pig-
mented lubricant being used for adjusting the
conditions of the first draw, while the pigmented
type disclosed can be used only for the second and
third drawing operations, since it is too slippery
for the first draw and would permit the blank
to slide between the blank holders without get-
ting a sufficient cup formed for the subsequent
operation.

In one test operation of the type just described,
80 of the coated blanks were run through the
dies, and only one of the 80 showed any evidences
of pick-up by the dies, and friction was reduced
as much as 75%.

An astonishing and unexpected result followed
the processing of the 80 phosphate coated blanks,
in that the processing of the 80 blanks was fol-
lowed with drawing of an additional 70 uncoated
blanks, and only one additional metal score from
pick-up was observed in the 70 additional blanks,
showing that the beneficial results were carried
over (apparently by the dies). The results from
the processing of the uncoated blanks are made
all the more unusual when it is considered that
in the ordinary stamping of the uncoated blanks
using the same lubricants, but without previ-

3

ously processing a series of coated blanks, pick-up occurred as frequently as every third or fourth draw, and caused bad scoring of the stampings. It was also necessary to stone the dies frequently under the previous practice because of the metal which the dies picked up from the blanks.

By using the new method and first running a series of coated blanks followed by a series of uncoated blanks, it is obvious that considerable savings in the use of the coating solution will be provided.

I claim:

1. In the cold deep drawing of steel sheets by means of dies, the steps of providing a thin chemically adherent coating of zinc phosphate on a quantity of said sheets, applying to said quantity of sheets, a non-pigmented lubricant containing a high fatty acid radical which chemically reacts with said coating, cold deep drawing said quantity of sheets by the use of dies whereby there is transferred from said sheets to said dies as the deep drawing is effected material which includes at least some of the phosphate coating material and some of the product of said reaction, applying to a smaller quantity of uncoated steel sheets a non-pigmented lubricant of the same type as applied to the coated sheets, and cold deep drawing said second smaller quantity of sheets by the use of the same dies, the lubricants being selected from the group consisting of approximately one per cent sodium soap—ninety-nine per cent water; approximately two per cent sulphonated tallow—ninety-eight per

4

cent water, the pH of the lubricant being approximately 8; approximately one per cent chlorinated paraffin, forming an emulsion with approximately two per cent sodium soap, using approximately ninety-seven per cent water.

2. A process as defined in claim 1, the number of coated blanks being in the order of 80, and the number of uncoated blanks being in the order of 70.

FORREST JEROME WHITNEY, JR.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,326,387	Mill	Aug. 10, 1943

OTHER REFERENCES

Journal of Physical Chemistry, vol. 36, 1932, pages 3108-3114.

Smith, Press Working of Metals, 1st ed., page 92, pub. 1896 by John Wiley & Sons, New York city.

Dies, Their Construction and Use, page 303, by Woodworth, published 1903 Norman W. Henley & Co., 132 Nassau Street, New York, New York.

Deep Drawing Qualities Improved by Phosphating, Stamping and Forming Section of Heat Treating and Forging, for June 1943.

American Machinist, Feb. 13, 1947, pages 117-128.