

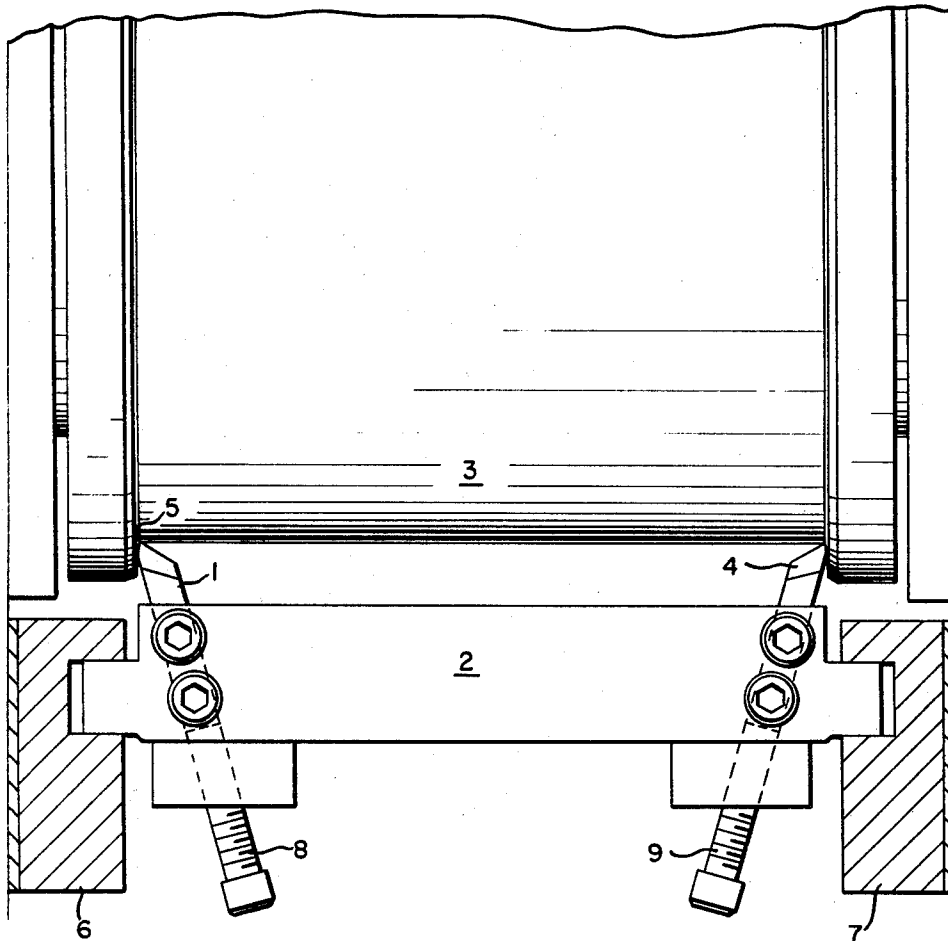
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W. L. PATTON ETAL

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ROLL FLANGE SCRAPING DEVICE AND PROCESS EMPLOYING SAME

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INVENTORS

WILBUR L. PATTON  
HARRY RILEY

BY

*Fred C. Carlson*  
ATTORNEY

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3,471,602

## ROLL FLANGE SCRAPING DEVICE AND PROCESS EMPLOYING SAME

Wilbur L. Patton, Silver Spring, and Harry Riley, Baltimore, Md., assignors to E. I. du Pont de Nemours and Company, Wilmington, Del., a corporation of Delaware

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2 Claims

### ABSTRACT OF THE DISCLOSURE

When metal powders are roll-compacted to strip between a pair of mating rolls, one of which has flanges at its ends enclosing the ends of the other roll at close clearance, the metal powder tends to weld to such flanges.

This is avoided by continuously scraping the inside faces of the flanges simultaneously by positioning thereagainst the cutting edges of a pair of scrapers mounted in fixed relation to each other but with freedom of lateral movement to match lateral movement of said flanged roll.

### BACKGROUND OF THE INVENTION

#### Field of the invention

The invention is in the field of powder metallurgy and more particularly the compaction of metal powders, by rolling, to form metal strip.

#### Description of the prior art

When metal powder is compacted to strip between opposing rolls there is a tendency for it to spill out at the ends of the roll gap, thus giving a sheet which is not compacted to the same density, coherence or thickness at the edges as in the middle. This leakage has been minimized by using as the compacting means a pair of rolls, one of which is recessed by providing it with a flange at each end and the other of which is not flanged and is mated to the first roll. Because of end play of the rolls it is very difficult to fit these flanges to a close enough clearance to avoid powder leakage without developing a tendency for the powder particles to weld to the flange faces and for the strip to become wedged between the flanges, with the attendant difficulty of discharging it from the rolls.

In Lund et al. U.S. Patent 3,162,708 a method is proposed for solving the latter problem by mounting a flange, of greater diameter than the roll, at each end of one of the rolls but spaced a short distance from each opposing end of the roll so that there are relatively narrow spaces between the roll ends and the opposing flanges. While this technique may aid in effecting release of the strip from the flanged roll, the rolled strip still requires superficial trimming along its edges during subsequent operations; furthermore, the described flange spacing has little or no preventive effect on the tendency of the powder particles to weld to the opposing flange faces.

### SUMMARY OF THE INVENTION

Now according to the present invention the foregoing and related problems of the prior art can be overcome, and metal powders can be roll-compacted to strip between a pair of mating rolls, one of which has flanges at its ends enclosing the ends of the other roll at close clearance, by processes and apparatus in which the opposed inside faces of the flanges are continuously and simultaneously scraped by positioning against them, respectively, the cutting edges of a pair of scrapers mounted in fixed relation to each other but with freedom of lateral

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movement to match any lateral movement of the flanged roll.

### BRIEF DESCRIPTION OF THE DRAWING

The drawing is a diagrammatic sketch, not to scale, of an apparatus of the invention in which there is a flanged roll 3 with inside flange faces 5. A pair of scrapers 1 and 4 are positioned on carriage 2 in such a manner that their cutting edges engage the inside flange faces, 5. Adjustment to effect such engagement is made by means of adjusting screws 8 and 9, and proper positioning guide blocks 6 and 7. The carriage 2 is mounted in guide blocks 6 and 7 in such manner as to permit lateral (i.e. right-left) movement to match lateral movement of the flange faces. Thus, if the flanged roll shifts to the right, pressure of the flange face 5 against scraper 1 will cause carriage 2 also to shift to the right, thereby maintaining contact between scraper 4 and its corresponding flange face.

### DESCRIPTION OF THE PREFERRED EMBODIMENTS

The apparatus and processes of this invention are applicable to the rolling of strip from powders of various metals and alloys, including titanium, aluminum, zinc, lead, stainless steel, tool steel, copper, and metals of the group consisting of iron, cobalt and nickel in which there is dispersed a particulate refractory oxide, such as thorium, having an average particle size in the range of about 5 to 120 millimicrons.

The invention is especially applicable to processes and mills for roll-compacting metal powders to strip wherein the powders are fed, as a mass in the shape of a blanket of uniform thickness and width, to the nip between a pair of mating rolls, such nip being enclosed at its ends by flanges at each end of one of the rolls.

The clearance between the flanges and the ends of the non-flanged roll is set close to minimize leakage of metal powder therethrough. With rolls 11.5 inches in diameter, for example, where the shoulders forming the flanges were 0.5 inch high, the flange-roll end clearance was set at .015 inch for rolling aluminum alloy powder. This was the minimum clearance permitted by the lateral roll motion or end-play of this pair of rolls. Unfortunately, it was found that the extruded flash (i.e., metal compacted in the flange clearance) had a tendency to weld to the ends of the non-flanged roll, resulting in edge-cracking in the sheet being produced.

The above-mentioned welding of powder particles in the roll end clearances also resulted in powder particles and agglomerates being welded to the inside faces of roll flanges, making difficult the discharge of the rolled strip and causing tears in the compacted strip. This difficulty was alleviated according to the present invention by simultaneously scraping the opposed inside flange faces as above described, whereby build up of such welded particles on the faces was avoided. It was also found that the tandem mounting of the tool points used as scrapers gave satisfactory performance in regard to tool life and adjustment. In contrast, individually mounted tool points, spring loaded in two dimensions, had unsatisfactorily short lives.

If desired the scrapers of this invention can be used in combination with transfer roll devices designed to apply lubricants to the ends of the rolls. Such lubricants will minimize the build-up of metal particles on the rolls and will facilitate their removal.

#### We claim:

1. In an apparatus for roll-compacting a metal powder to strip between a pair of rotating, mating rolls, one of which has flanges at its ends enclosing the ends of the other roll at close clearance, the improvement which

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comprises, in combination therewith a scraping mechanism consisting of a pair of scrapers, each of which has a cutting edge positioned against one of the opposed inside flange faces of the flanged roll, said scrapers being mounted in fixed relation to each other upon a carriage, said carriage being mounted in guide blocks in such manner as to permit lateral movement of the carriage to match lateral movement of the flange faces.

2. In a process for roll-compacting a metal powder to strip between a pair of mating rolls, one of which has flanges at its ends enclosing the ends of the other roll at close clearance, the improvement which comprises continuously and simultaneously scraping the opposed inside faces of the flanges by positioning against them, respectively, the cutting edges of a pair of scrapers mounted in fixed relation to each other but with freedom of lateral

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movement to match any lateral movement of the flanged roll, whereby metal powder welded to said roll flange faces is continuously removed.

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WILLIAM J. STEPHENSON, Primary Examiner

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