A wiper ring for cleaning the inside wall of the operating cylinder of a hydromatic variable pitch aircraft propeller. The ring has a debris collecting wiper edge and incorporates a plurality of permanent magnets spaced at intervals along its length to attract and hold ferrous particles collected by the wiper edge and prevent them from being abraded into the inside wall of the operating cylinder.
1 WIPER FOR MACHINED SURFACES

STATEMENT OF GOVERNMENT INTEREST

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to surface wiping devices and especially devices for cleaning minute metal particles from a machined surface.

2. Description of the Prior Art

It has been found that small particles or chips of metal are easily entrapped into the surface of sealings, rings, packing glands, etc., and, by their abrading action, soon cause wear on any machined surface which they contact.

This is particularly true within the dome shell of a hydrostatic variable pitch constant speed propeller where such particles are concentrated by centrifugal action. These chips then score the inside wall of the shell as the piston is translated back and forth.

Therefore various packing glands, seals and scrapers have been employed to remove undesired abrasive particles from a work surface. These are frequently ineffective because the surface contacting portions soon become loaded and clogged and the particles entrapped thereby would be scraped back and forth over the work surface abrad ing the same and augmenting the wear problem.

SUMMARY OF THE INVENTION

A wiper ring employs magnets to attract ferrous metallic particles away from the surface being wiped. Due to the shape of the ring non-ferrous particles scraped off of the surface may also become entrapped in an annular trough away from such surface.

STATEMENT OF THE OBJECTS OF THE INVENTION

It is an object of the present invention to provide a surface cleaning apparatus which will remove particles from an area where they can do harm.

A further object is to provide a ring shaped wiper member having a trough portion for accumulating small abrasive particles which otherwise might damage a surface to be protected.

Another object is to provide such wiper member with means remote from the surface to be protected for attracting ferrous particles and concentrating them in a protected area remote from such surface.

Other objects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical sectional view through a portion of a propeller pitch control cylinder embodying a wiper constructed in accordance with the present invention.

FIG. 2 is a fragmentary sectional view of a portion of FIG. 1 showing a slightly modified form of the present invention.

FIG. 3 is a side view of the wiper of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawings the invention is shown as applied to the contact area between a piston member 10 and the inner wall of a dome shaped shell 12. In this arrangement a pair of annular pressure seals 14 are shown to prevent leakage from a chamber 16 of high pressure fluid which is pumped into and out of the chamber in order to cause piston movement and consequent change in propeller blade angle, all as is well known in the art.

As best shown in FIG. 1 the piston 10 may have a circumferential groove or recess 18 on the high pressure side of seals 14 and over the reduced diameter portion so formed may be fitted a wiper ring 20 of elastomeric material. The ring is preferably rounded at portion 22 to accommodate the similarly shaped slope 24 of recess 18 so that the two parts fit snugly together when joined.

Wiper ring 20 may also be provided with an inclined rib or flange 26 terminating in a flatted contact surface 28 which lies in firm contact with, and “wipes” over, the inner wall 30 of the shell dome 12 upon relative movement of the parts.

Inclined rib 26 projects away from the main portion of the ring so that an annular open sided cavity or trough 32 of substantially triangular cross sectional shape is provided in which wear-producing particles and contaminants may be received.

In order particularly to attract ferrous metal particles into this trough there may be provided about the wiper ring a plurality of suitably shaped permanent magnets 34, each of which may have an exposed surface 36 if desired. These may be retained in place by any suitable means such as lip 38 which prevents displacement of magnets 34. Of course other means may be employed for this purpose since the magnets may be attached mechanically, or may be cemented or otherwise bonded in place.

In FIG. 2 is shown an embodiment wherein magnets 40 are substantially encapsulated in the wiper ring. In this embodiment it has been found that the magnets may successfully be formed short bars of “Alnico” material and have a length of about 0.625 in. and a diameter of about 0.125 in. When such magnets are distributed about a wiper at 5° intervals, as indicated in FIG. 3, in a ring having a radius of 4.9 in. 72 magnets of the foregoing size have been found to effectively retain ferrous chips and to significantly minimize scoring.

In order to prevent a differential pressure from building up across the wiper 20 (as might occur with leakage past the piston seals 14) it may be provided with small bleed holes 42 located at selected spaced intervals around the wiper.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

I claim:

1. An abrasive material entrapping wiper for circular hydraulic elements having reciprocatory motion comprising:
   a ring of resilient material having a contact surface engageable with and slideable over a surface to be wiped,
   said ring being mountable upon a support surface with which the surface to be wiped has relative movement,
   the cross sectional configuration of said ring being shaped to provide a trough portion spaced from the surface being wiped and into which trough contaminant particles may be swept and retained;
   means for generating magnetic lines of force in the area of said wiping contact to thereby attract particles subject to such force to the trough portion removed from the wiped area;
   wherein the means for generating magnetic lines of force comprise magnets distributed at intervals along the wiper, said magnets being embedded in the wiper, being elongate and having their axes parallel to the surface to be wiped.

2. An abrasive material entrapping wiper for circular hydraulic elements having reciprocatory motion comprising:
   a ring of resilient material having a contact surface engageable with and slideable over a surface to be wiped,
   said ring being mountable upon a support surface with which the surface to be wiped has relative movement,
   the cross sectional configuration of said ring being shaped to provide a trough portion spaced from the surface being wiped and into which trough contaminant particles may be swept and retained;
means for generating magnetic lines of force in the area of said wiping contact to thereby attract particles subject to such force to the trough portion removed from the wiped area; said wiper having a plurality of bleed holes located at intervals therearound to prevent buildup of a pressure differential across the wiper.