



COVER:

The advanced technology of LEONARDO DA VINCI 1452-1519.

During the sixteen years Leonardo was in the service of Duke Ludovico Sforza, he produced numerous sketches on optics, mechanical engineering and anatomy. It appears he was searching for identical mechanisms in nature and man. In all areas of industry and engineering, he displayed his prophetic genius.

Leonardo sketched dozens of devices aimed at translating movement back and forth between rotary motion and piston-like reciprocating action. Windlasses, cranes, winches and pulley-blocks are seen through the pages of his notebooks. They each try, through sophisticated reducing gears, to outdo all the others in efficiency. The drawing above is a windlass and is one of the most perfect and precise designs of which working models have been built in modern times.

The cover drawing displays on the left an assembled mechanism for changing the rocking motion of an upright lever to the rotary motion of a shaft, so as to lift a heavy weight. The illustration on the right is an exploded view of the same mechanism. As the operating lever is rocked back and forth, the stone suspended by a rope is wound upwards around the horizontal shaft. The rocking lever swings a square shaft, upon which are two fixed wheels. There are pawls on the outside edges of the wheels, which engage ratchets in the bores of two outer rings. These ratchet wheels also have gear teeth engaging a common lantern gear on the final shaft. When the operating lever is pushed one way, it engages the ratchet wheel. Pushed the other way, and the other pawl engages the ratchet wheel; however, the shaft revolves in the same direction. One application of this principle was found in Da Vinci's own work in an illustration of a paddle-driven boat.

## Guest Editorial



At a time when there are many pressures on the Gear Industry and its representative Association, the American Gear Manufacturers Association, it seems particularly appropriate that *Gear Technology — The Journal of Gear Manufacturing* appears. AGMA is particularly pleased to have the opportunity to write the first editorial for this magazine. Over many years, the Gear Industry has had a need for an educational and training journal as well as a resource and reference document on gears, gear products and flexible couplings.

It is further hoped that this magazine will reproduce some of the many papers that are published worldwide on gearing. There is much technological development work that is being carried on throughout the world which should be brought to the attention of everyone in this industry. In addition, there must be a larger, continuing effort on the part of American Manufacturers in the area of gear research. As an advocate and supporter of this and as a forum for the exchange of such knowledge, this journal can be of great value to the Gear Industry. AGMA salutes Michael Goldstein, Editor of *Gear Technology — The Journal of Gear Manufacturing* and wishes him God-Speed in the years to come with this exciting new venture.

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