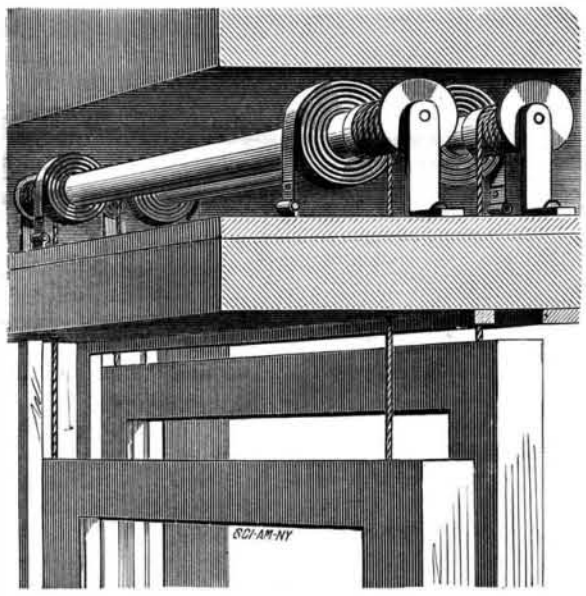
IMPROVED SASH BALANCE.

The novel sash balance shown in the engraving is the invention of Mr. George W. Arnold, of Knoxville, Ill. This device replaces weights and the ordinary springs, and provides a really mechanical device for balancing window sash. The invention consists of a miniature windlass provided with two coil springs, one near each end, the inner ends of the springs being fastened to the roller, and the outer ends secured to the top of the window frame. The bearings of the rollers are also secured to the top of the window frame, and cords extend from the ends of the rollers downward through holes in the window frame and are attached to the sash. The springs are put under sufficient tension to nearly



ARNOLD'S SASH BALANCE.

lift the sash. When the sash is raised the cords are wound upon the roller, and when the sash is lowered the unwinding of the cord winds the spring. All the parts of this sash balance are readily accessible for adjustment or repairs.

Men and Other Animals as Seed Carriers.

The "tick seed" (*Desmodium*) is a good example of a seed which the mother plant provides with means of clinging to almost any passing object. The pods of the "tick seed" are almost completely covered with small hooks, which catch hold of the clothing or the wool and hair of animals, and are carried away from the place where they were produced.

The genus *Bidens* of the sunflower family furnishes very familiar examples of seed distribution by animals. Each seed covering is provided with two stout prongs, which are barbed, with the points of the barb extending backward from the point. These prongs pass easily into clothing or the coverings of animals, but are not readily detached. These "pitch forks," as they are commonly called, have no other use for their barbed outgrowths than to aid in the distribution of the seed, and sheep, dogs, and other animals are employed in carrying the young Bidens from place to place. The burdock furnishes another fine illustration of a natural provision on the part of the mother plant for a distribution of her offspring by passing animals. The burr, containing many seeds, is surrounded by a multitude of sharp hooks, and by these the whole burr is closely fastened to man and beast. The reader will call to mind instances where cattle, sheep, dogs, and even horses have become partially covered with these closely clinging burrs. In this way the burdock seed may be carried from one State to another. Strange plants are frequently found near mills in which wool is carded and prepared for weaving. The wool comes in the fleece from various parts of the country, and perhaps from other countries, and the seeds clinging to the wool are separated, thrown out as refuse, and afterward, finding suitable ground, germinate and produce plants new to the locality. The smaller animals, and those not domesticated, as the rats and mice, act their part in this grand scheme for the spreading of the seeds of plants. Cotton is perhaps the most familiar vegetable product which is produced as a means of seed distribution. The human family is greatly blessed by this provision on the part of the cotton plant. Each cotton seed is completely inclosed in a tuft of fine hairs, by means of which the seed is easily and quite securely fastened to a person's clothing or to the coverings of animals.

The fowls of the air are active seed bearers, especially those of small berries or pulpy fruits with small and hard seeds. The indigestible covering preserves the seed, while the exterior soft parts with their usual high color insure their being eaten. In this way the seeds of the blackberry, raspberry, currant, cherry, and a host of wild berry bearing plants have their seeds carried far and wide.

The Sparrow Nuisance.

The English sparrow, which has become so prevalent throughout the country, has demonstrated itself to be a first-class nuisance, fighting and squawking continually among themselves, and driving robins and other domestic birds from their usual haunts. How to get rid of the ubiquitous sparrow is now the question. In Germany and England the sparrow is a game bird, and is much sought after for pies, which are highly prized. By all means, says one of our contemporaries, put him on the list of game birds in this country, and make the season from January 1 to December 31. In addition to this it would be well, suggests the same authority, to offer rewards for methods of popularizing the sparrow as an article of diet.

Steam Whistles.

A correspondent of the *Railroad Gazette* recommends a steam horn instead of a steam whistle. He says that "as a general rule the steam whistle must be very powerful to be effective within half a mile. Now, if instead of a whistle a horn were to be used, the gain in useful effect would be great, while the disagreeableness of tone would be much, if not entirely, reduced. The form of such a horn with a mouthpiece or forcing tube would be extremely simple, of inconsiderable expense (less than that of the ordinary whistle), and instead of the screeching sound of the latter, it would yield the mellower tone of the modern tuba or cornet-a-piston, to which we suppose most persons will not object." There seems to be a good opportunity here for some ingenious person to exercise his inventive talents.

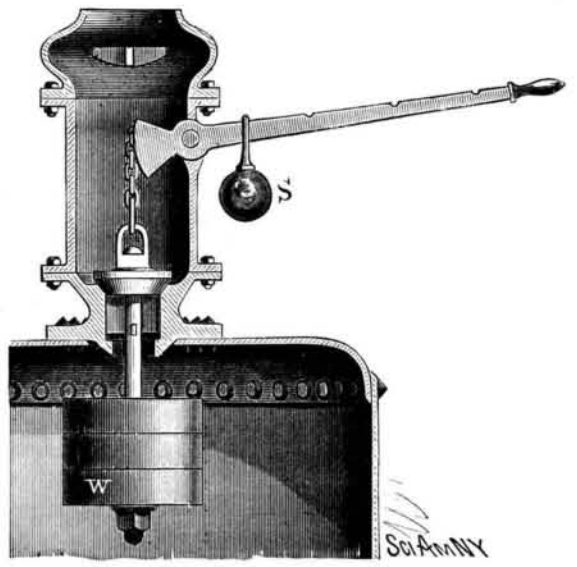
NEW SPANISH WAR STEAMERS.

Our engraving, from *La Ilustracion*, of Madrid, represents one of four new gun boats, all alike, and now in progress of construction in Spain. Their names are the General Concha, the Mgallánes, the Elcano, the General Lezo. The General Concha was launched last September, and is represented in our picture. These ships have a length of about 160 feet, beam 25 feet, displacement 524 tons, 600 horse power. Ordinary armament, three Hontoria guns; and on special occasions they will carry a large gun at the bow.

IMPROVED SAFETY VALVE.

The safety valve represented in the annexed engraving combines in one device both the lock form of valve and the open or adjustable one, with the advantage that, being the valve in ordinary use, it is not so liable to stick as is the ordinary lock valve, which operates only under excessive pressure, and in some cases fails to act altogether.

This improved valve employs a lever of a different order than the one ordinarily used, and there is a slack connection between the lever and the valve. The fulcrum of the lever is intermediate between the power applied and the weight to be raised, and the valve is inclosed within a lock-box or case, as also is its slotted rod or chain connection with the short arm of the lever. The valve itself is loaded, either



GREGORY'S SAFETY VALVE.

above or below, with a maximum weight, W, that corresponds to the extreme pressure the boiler should carry. Arranged upon the longer arm of the lever, which is exposed for control of the engineer, is an adjustable weight, S, for regulating the valve to blow off at any less pressure than the maximum one. Any extra weight put upon this arm of the lever eases the lift of the valve, which accordingly cannot be overloaded, and any propping up of the lever simply operates to slacken the connection between the lever and the valve, that is left free to act under its maximum load, W. This valve has never been patented, but was invented, as we are informed, by Mr. A. Gregory, of Newark, N. J., over thirty years ago, who has shown us a drawing made at that time which exhibits several modifications of the invention.

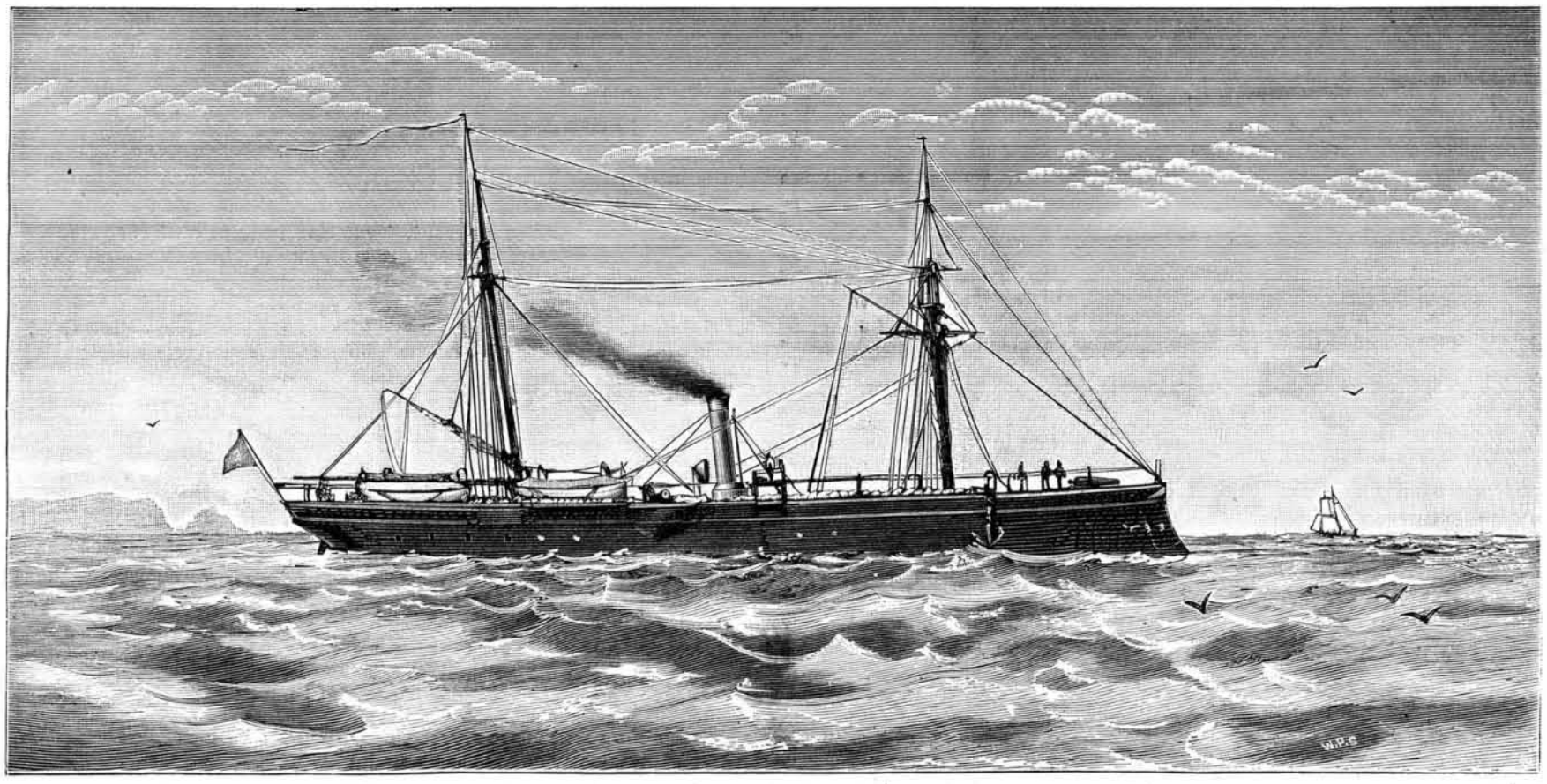
Steel for Cutting Tools.

C. Reichel, of Berlin, gives the results of many years of observation on the preparation of steel for tools in the *Zeitschrift für Instrumentenkunde:*

First, the steel must only be heated to dark red, which is the temperature at which a film of soot burns off.

Secondly, the heated article must be carefully protected from oxidation, hence a flame rich in carbon must be used, and the immersion be done as quickly as possible, so as not to keep it long in the air.

Thirdly, water used for hardening must be free from alkalies and carbonate of lime.



THE NEW GUN BOAT GENERAL CONCHA, OF THE SPANISH NAVY.