

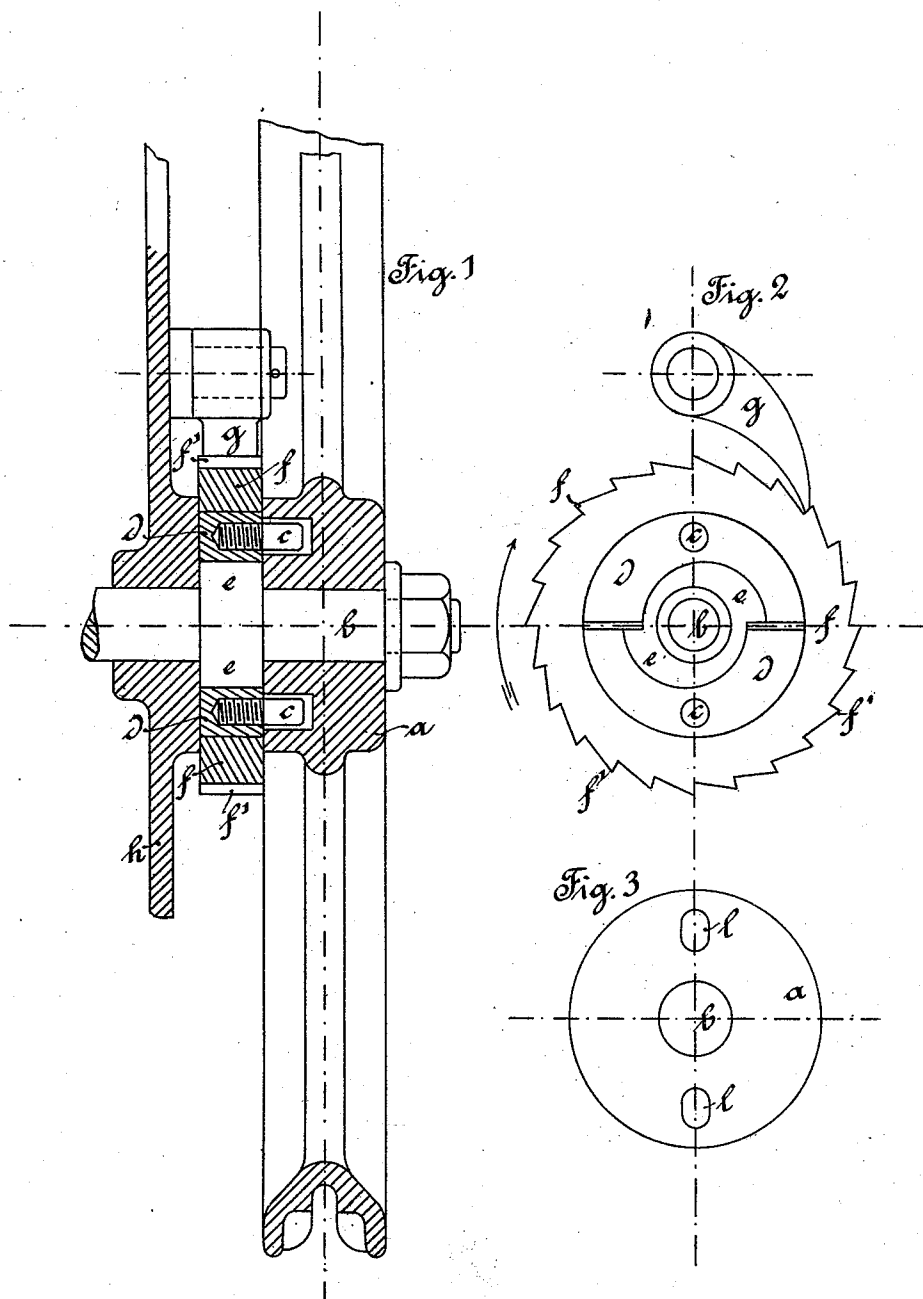
(No Model.)

2 Sheets—Sheet 1.

A. BOLZANI.
BRAKE FOR LIFTING APPARATUS.

No. 543,287.

Patented July 23, 1895.



Witnesses:

B. W. Brown,
Albert Popkema

Inventor.

Anton Bolzani
by Herbert W. Jenner.
Attorney.

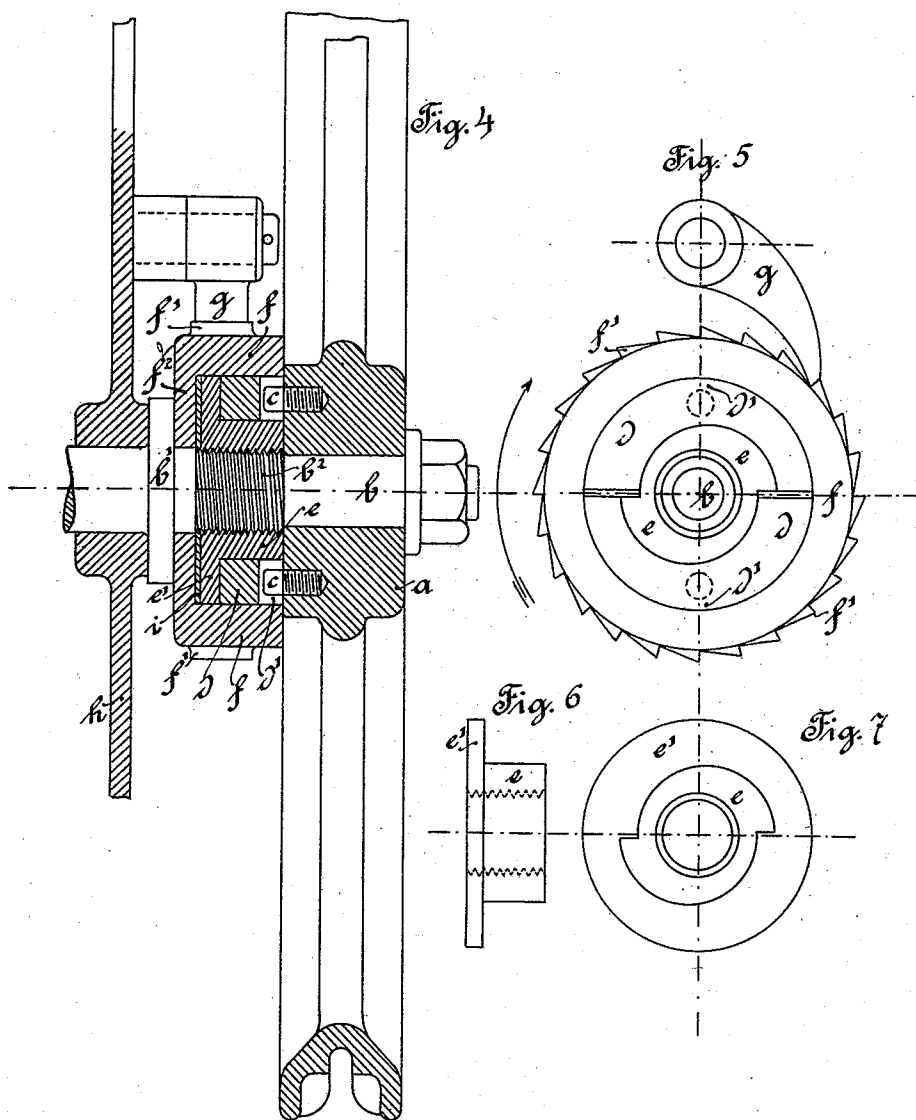
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UNITED STATES PATENT OFFICE.

ANTON BOLZANI, OF BERLIN, GERMANY.

BRAKE FOR LIFTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 543,287, dated July 23, 1895.

Application filed March 30, 1895. Serial No. 543,849. (No model.)

To all whom it may concern:

Be it known that I, ANTON BOLZANI, a subject of the King of Prussia and German Emperor, residing at Berlin, Prussia, Germany, have invented certain new and useful Improvements in or Relating to Brakes for Lifting Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a combined coupling and brake hereinafter termed a "coupling-brake" for use in lifting apparatus, and is applicable with advantage to any kind of lifting or hoisting gear, without necessitating any special construction to permit its use. Moreover, this coupling-brake may be combined with a second of the same kind.

Apparatus constructed according to this invention comprises cylindrically-curved wedges placed in the hollow center of a brake-ring that can only be turned in one direction and pressed against eccentrically-formed cam-rings mounted on the shaft to be acted upon.

In the accompanying drawings, Figure 1 is a partial vertical central section of one construction of apparatus according to this invention at one end of the shaft carrying the coupling-brake. Fig. 2 is a front elevation of a part of the apparatus shown in Fig. 1. Fig. 3 is a front elevation of the nave of a part of the driving mechanism of the apparatus shown in Fig. 1. Fig. 4 represents a vertical central section at the end of a shaft carrying an alternative construction of apparatus according to this invention—that is to say, the coupling-brake in combination with a second similar brake. Fig. 5 is a front elevation of a detail of the apparatus shown in Fig. 4; and Figs. 6 and 7 are side and front elevations, respectively, of the cam-rings mounted on the shaft of the apparatus shown in Fig. 4.

Like reference-letters indicate like parts throughout the drawings.

h indicates the frame of the lifting or hoisting gear, whether a winch, pulley-block, or jack or other lifting apparatus.

b is a shaft carrying the gearing thereof, to which is secured the operative part of the driving mechanism (crank, hand chain-wheel,

belt-driven pulley, or toothed wheel) and which is to be prevented by the coupling-brake from running back under the weight of the load. On this shaft is secured, also, in the construction illustrated by Figs. 1 to 3, a cam-ring *e*, consisting of two or more cylindrical sectors, while *d* are cylindrically-curved cam-pieces, which are in contact, by means of their inner surfaces, with the outer surfaces of the cam-ring *e* and by means of their outer surfaces with the inner cylindrical surface of the brake-ring *f*, fitted with ratchet-teeth *f'*. A pawl *g* permits the brake-ring *f* only to rotate in the lifting direction. The cam-pieces or curved wedges *d* are coupled, by the pins or drivers *c'*, with the driving apparatus, (a crank, hand chain-wheel, or other appliance,) the said drivers being either, as shown in Fig. 1, secured to the cam-pieces *d* and engaged in radially-cut slots *l* in the nave *a*, Fig. 3, of the driving-wheel, or the like, or, as shown in Figs. 4 and 5, secured in the nave *a* of the driving-wheel and engaged in radial slots *d'* in the cam-pieces *d*.

The working of this brake device is as follows: If the hand chain-wheel or crank-arm or the like be caused to rotate in the direction shown by the arrow in Fig. 2, the cam-pieces *d* in the space between the cam-ring *e* and the brake-ring *f* are forced in the same direction, whereby the coupling of the brake-ring and driving agent with the shaft *b* is effected through the cam-pieces *d* and cam-ring *e*. The brake-ring *f* must therefore rotate together with the said shaft, and, in the event of the cessation of the lifting or hoisting movement, the recoil or sinking of the load is prevented by the pawl *g* catching in one of the teeth of the brake-ring.

The dropping of the load is only possible if the crank or other operative part be caused to rotate in the direction opposite to that shown by the arrow in Fig. 2, whereby the cam-pieces *d* are loosened in the brake-ring *f*. So soon as that lowering motion ceases, the weight or load immediately, by means of the cam-ring *e*, brings about a pressure of the cam-pieces *d* upon the cam-ring *e* and brake-ring *f*, and the mechanism is effectually brought to a standstill.

The alternative construction illustrated in

Figs. 4 to 7 consists in the combination of the above-described coupling-brake with a screw-brake. For this purpose the shaft *b* has a fixed collar *b'* thereon and a screwed part *b*², and the brake-ring *f* is provided with a flange *f*², which lies against the fixed collar of the shaft, while the inner cylindrical surface of the cam-ring *e* is fitted with a female screw corresponding to the screw-thread *b*² on the shaft on which it can move. The cam-ring *e* is also fitted with a flange *e'*, which comes in contact with the flange *f*² of the brake-ring *f*, which it presses up against the fixed collar *b'*. A leather washer *i* serves to give elasticity to the change between brake action and relaxation. If, now, by means of the hand chain-wheel, crank-arm, or other driving device the cam-pieces are moved in the direction of the arrow—*i. e.*, of the lifting movement—then the cam-ring *e* will also be turned and thereby, up to a certain point, the brake action will hold the brake-ring *f* fast, and, after the attainment of a certain degree of resistance, there will be established, by means of the cam-pieces *d*, a coupling between the cam-ring and the brake-ring, so that the latter is closely connected to the shaft and the load is thereby effectually prevented from sinking or dropping automatically. By the opposite motion of the cam-pieces through the operation of the driving part of the machine in the direction contrary to that shown by the arrow the coupling of those cam-pieces with the inner cylindrical surface of the brake-ring is relaxed and the load sinks despite the brake action of the screw-brake, which is not so powerfully set in action as to entirely arrest all motion of the load. As soon, however, as the lowering movement of the driving agent is arrested, the cam-pieces *d* once more resume a position of rest rela-

tively to the brake-rim *f* by means of the cam-ring and call into action the full brake-power of the apparatus. By means of these successive variations of action and release of the two brakes thus united the brake-pressure is so regularly, evenly, and favorably distributed that, with the most complete safety, an equally easy descent of the load is provided.

I declare that what I claim is—

1. In lifting apparatus, the combination, with a support, and a driving shaft journaled therein and having cams *e* revolving with it; of two revoluble and slidable semicircular wedges mounted on the said cams, a driving device mounted on the said shaft and operatively connected to the said wedges, a brake ring encircling the said wedges and provided with ratchet teeth, and a pawl pivoted to the said support and engaging with the said ratchet teeth, substantially as set forth.

2. In lifting apparatus, the combination, with a support, and a driving shaft journaled therein and provided with a collar and a screwthreaded portion; of the cams *e* engaging with the said screwthreaded portion, two slidable semicircular wedges mounted on the said cams, a driving device mounted on the said shaft and operatively connected to the said wedges, a brake ring encircling the said wedges and provided with ratchet teeth on its periphery and a flange bearing against the said collar, and a washer interposed between the said flange and the ends of the said cams, substantially as set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

ANTON BOLZANI.

Witnesses:

REINHARD WEYNITZ,
JEAN P. SCHMINT.