

H. F. MENCK.

EXCAVATOR.

APPLICATION FILED FEB. 10, 1909.

957,234.

Patented May 10, 1910.

2 SHEETS—SHEET 1.

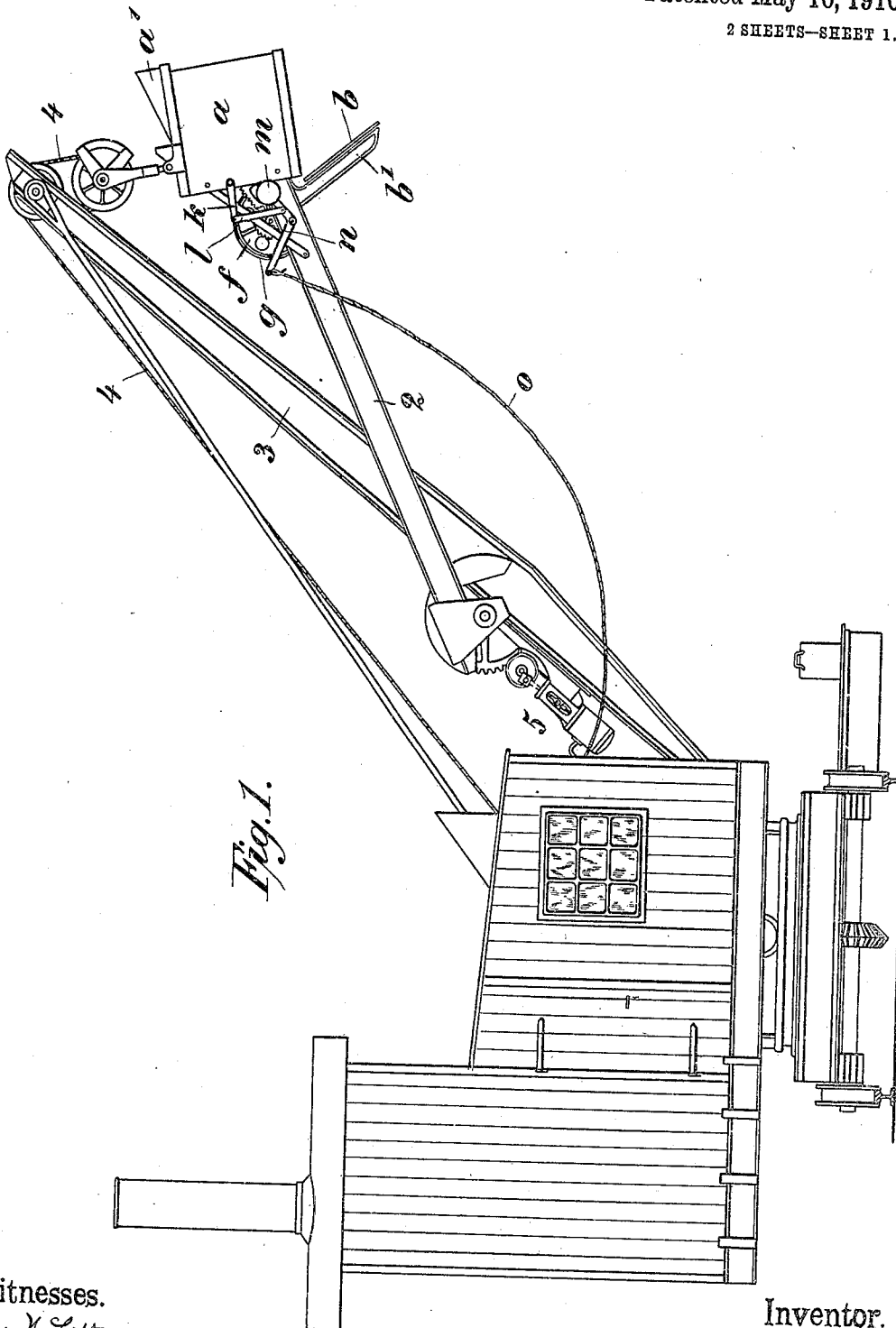


Fig. 1.

Witnesses.

Jesse H. Sutton.

B. Rommers

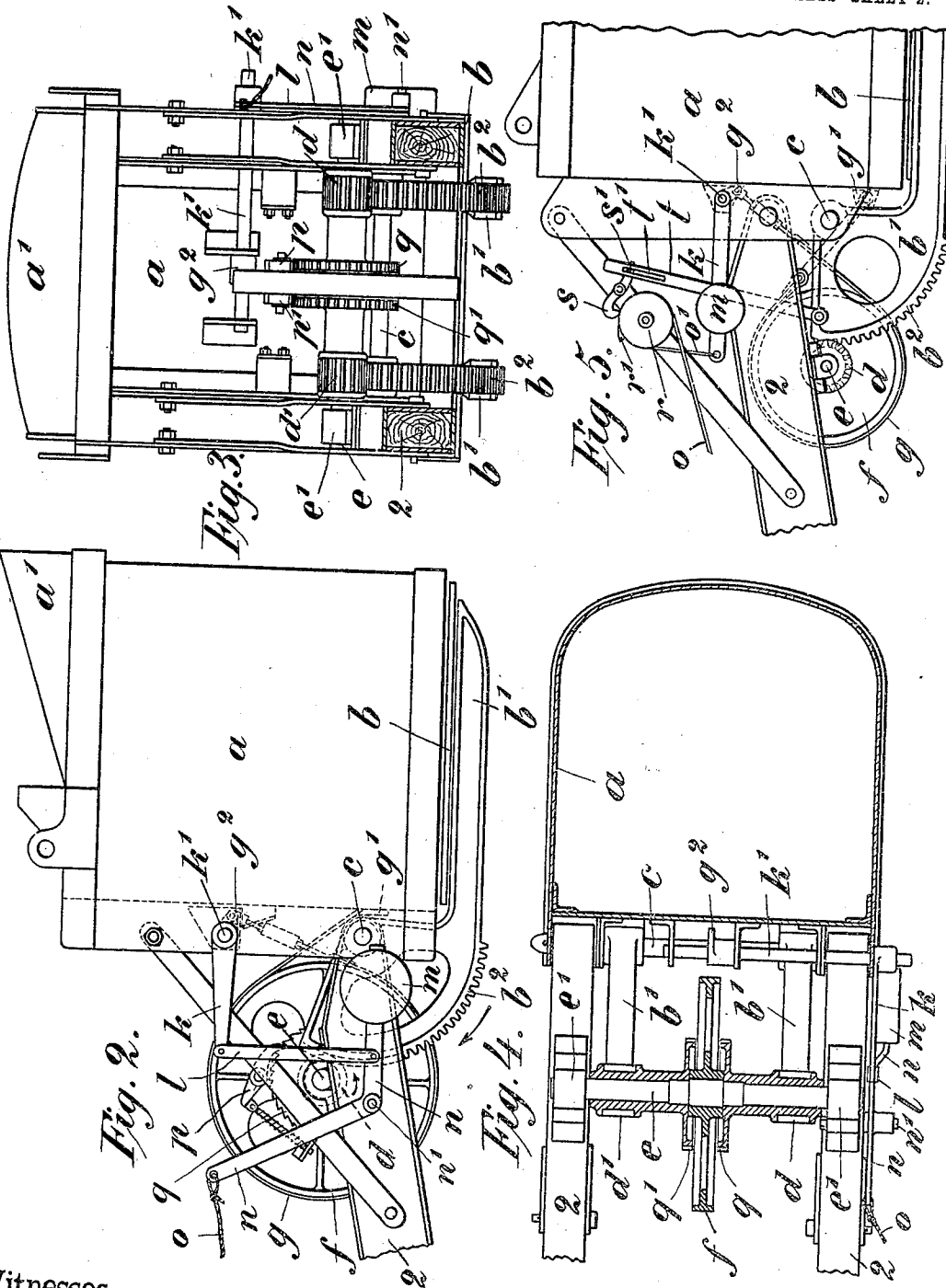
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957,234.

Patented May 10, 1910.

2 SHEETS—SHEET 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

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EXCAVATOR.

957,234.

Specification of Letters Patent.

Patented May 10, 1910.

Application filed February 10, 1909. Serial No. 477,155.

To all whom it may concern:

Be it known that I, HANS FRIEDRICH MENCK, a subject of the German Emperor, and resident of Gross-Flottbeck, Province of Schleswig-Holstein, Prussia, German Empire, have invented certain new and useful Improvements in Excavators, of which the following is a specification.

The present invention has for its object improvements in excavators and relates more particularly to the provision of a braking mechanism in conjunction with the bottom flap of the scoop in order to render it possible to brake or regulate the opening movement of the bottom flap so that the emptying of the scoop can be effected by the operator slowly or quickly according to requirements.

In excavators the scoop is emptied, as is known, by opening the bottom of the scoop which is formed as a flap, after the filled scoop has been swung over the receptacle (truck or the like) intended for the reception of the material. In the constructions heretofore adopted the opening of the bottom flap is effected by releasing a bolt, whereupon the flap suddenly swings downward and the entire contents of the scoop are discharged in one operation. Owing to this arrangement, the truck or the like into which the material is loaded experiences a harmful shock. Now in order to obviate this defect and to empty the scoop gradually and discharge its contents into the truck without shock, in accordance with the present invention the flap is combined with an appropriate braking mechanism (such as a band brake, air or liquid brake or the like) by means of which it is possible to cause the flap to open slowly, that is to say to brake and regulate the opening movement of the flap in the desired manner. The arrangement is also such that during the descent of the scoop the flap automatically recloses so that when the scoop again comes into contact with the ground to be excavated the flap is closed.

The invention is illustrated in the accompanying drawings in which:—

Figure 1 is a side elevation of an excavator constructed in accordance with and embodying the invention, the bottom flap of the scoop being shown open. Fig. 2 is a detail view of the scoop in side elevation to a larger scale, with the bottom flap closed. Fig. 3 is an end elevation and Fig. 4 is a par-

tial sectional plan of Fig. 2. Fig. 5 is a similar view to Fig. 2, and illustrates a modified form of braking mechanism.

The excavator (Fig. 1) is mounted in well known manner on a carriage which traverses on a temporary track. On one end of the frame is a crane 3 which has a circular adjustment on the axial post of the ground plate of the excavator. The crane is provided with a suitable chain- or wire-rope tackle 4. To the end of the latter is suspended a scoop *a* made of boiler-iron, whose lip *a*¹ is a steel edge preferably with fingers (not shown). Direction is given to the scoop *a* by means of a beam formed of two parallel arms or rails 2 which are jointed to the crane 3. When the scoop has been thrust into the earth, the beam affords a fulcrum on which the scoop rotates when the tackle 4 is wound up on the drum by the action of a steam-engine mounted on the excavator platform.

The engine 5 for operating the beam 2 is mounted on the crane 3.

The scoop *a* which cuts into the ground by means of its lip or cutting edge *a*¹ comprises a bottom flap *b* carried by two yoke pieces *b*¹ rotatable around the shaft *c*. The rear portions of these yoke pieces which are coaxial with the shaft *c* are formed as toothed sectors *b*² and mesh with gear wheels *d* *d*¹ on a shaft *e* the bearings *e*¹ of which are fixed on the arms of the scoop-beam 2. The shaft *e* carries a brake disk *f* the brake band *g* of which is fixed at *g*¹ to the wall of the scoop and to an arm *g*² on a shaft *h*¹ mounted on the rear wall of the scoop. The outwardly projecting end of the shaft *h*¹ carries a lever arm *h* which is connected by means of a link *l* with the arm of a bell crank lever *n* loaded with a weight *m*. At the free end of this bent lever *n*, which is rotatably mounted at *n*¹ to the beam 2 of the scoop, is attached a pull-rope *o* or the like leading to the operator's stand. The weight *m* of the lever *n* tends to exert a tractive effort upon the brake band *g* through the link *l* and the brake lever device *h* *h*¹ and *g*², whereby the disk *f*, the gear wheels *d* *d*¹ and consequently the bottom flap *b* are held in the closed position. If, however, a tractive effort is exerted upon the rope *o* by the operator after the filled scoop has been brought over the receptacle to be loaded, the brake band is released. Owing to the weight of the flap

10 b , of the arms b^1 and of the load resting upon
 the said flap of the scoop, this flap b will
 open and the scoop will empty more or less
 rapidly according to the pull exerted upon
 15 the rope o and the release of the brake there-
 by effected; if desired the discharge can be
 stopped entirely. When the scoop has been
 emptied and is to be lowered for a fresh cut,
 the flap closes automatically owing to the
 20 sinking of the scoop. For this purpose the
 brake disk f which is loosely mounted on
 the shaft e (Fig. 4), is provided on each side
 with a spring-controlled pawl p or p^1 . These
 25 pawls engage with ratchet wheels q or q^1
 which are rigidly connected with the hubs
 of the corresponding gear wheels d or d^1
 loose upon the shaft e . When the flap opens
 after the lifting of the scoop upon the re-
 30 lease of the brake, the toothed sectors b^2
 cause a rotation of the gear wheels d d^1 in
 the direction indicated by the arrow in Fig.
 2. The ratchet wheels q q^1 are thus rotated
 in the direction toward the pawls p p^1 and
 35 the latter carry the brake disk f around
 with them. When the bottom flap b is
 opened the brake disk f is coupled with the
 ratchet wheels q q^1 of the gearing d d^1 by
 the pawls p p^1 , and the gearing, the ratchet
 40 wheels and the brake disk then rotate as a
 whole toward the left hand, relatively to
 Fig. 2. Upon the descent of the scoop the
 flap again closes, however, under the in-
 fluence of gravity, the toothed sectors b^2 ,
 45 the gear wheels d d^1 and consequently the
 ratchet wheels q q^1 rotate in the opposite
 direction, that is to say to the right hand
 relatively to Fig. 2 whereby the pawls p p^1
 of the brake disk, which is held by the closed
 50 braking mechanism g , slide over the ratchet
 teeth. The tightening of the brake band g
 is effected automatically by the action of the
 loaded lever m , n which holds the brake
 band applied so long as no tractive effort is
 55 exerted upon the rope o . The bottom flap
 is closed entirely automatically when the
 scoop has been emptied, without the neces-
 sity for any action on the part of the opera-
 tor upon the braking mechanism; this mech-
 60 anism remains applied by the weighted lever
 m n after the release of the rope, and during
 the emptying and lowering of the scoop.
 When the scoop fills with the material which
 is being excavated, the latter exerts a pres-
 65 sure against the flap b . The flap cannot
 open however because the pawls p p^1 of the
 brake disk f do not permit of the rotation of
 the ratchet wheels, the gear wheels d d^1 or
 of the toothed sectors b^2 .

The brake can be used without any ratchet
 gear, in which case as shown in Fig. 5 the
 brake disk f is fixed on the shaft e and when
 the scoop descends the brake must be held
 65 released until the flap occupies its closed
 position. This can be effected either by
 exerting a continuous traction upon the rope

or by means of special devices which re-
 tain the brake lever in the released position
 in which the brake is not applied and again
 release it at the proper time.

As shown in Fig. 5 the rope o is passed 70
 around a roller r to which it is fixed. The
 roller r carries on its periphery a locking
 tooth r^1 or a number of such teeth. A lock-
 ing pawl s formed as a two-armed lever 75
 bears against the periphery of the roller; its
 rear arm carries a pin s^1 which is guided in
 a slot t^1 in a rod or link t pivoted to the
 yoke b^1 . The roller r is connected by a rope 80
 o^1 with the brake lever k , upon which the
 weight m is likewise arranged. During the
 excavation the flap b is closed, because the
 brake weight m applies the brake. When it
 is desired to release the brake for the pur-
 85 pose of emptying the raised scoop a tractive
 effort is exerted upon the rope o . This ro-
 tates the roller r and by means of the con-
 necting rope o^1 draws the brake lever k and
 the weight m upward. It is now possible to
 lift the brake weight m to such a height as
 is necessary for slowly opening the flap. 90
 When the flap is fully open the rope o is
 again pulled vigorously, thereby raising the
 weight m to its highest position. The brake
 band is now released fully. The brake 95
 weight retains this position because the lock-
 ing tooth r^1 has been seized by the pawl s
 thereby preventing retractive rotation of the
 roller r . The rope o can now be released and
 the brake remains unapplied. If the scoop
 is now lowered for a fresh cut the scoop flap 100
 b again closes. Shortly before the flap en-
 tirely closes the rod t acts in such a manner
 that owing to its displacement the upper
 end of its slot strikes against the pin s^1 upon
 the pawl s and causes the latter to disengage 105
 from the locking tooth r^1 . The weighted
 lever k m in its reversal then applies the
 brake and the rope o^1 again brings the tooth
 r^1 into the position shown in Fig. 5. When
 the weighted lever is reversed, the rope o is 110
 re-wound upon the roller r in its rotation.
 The condition obtaining during excavation
 is thus reestablished. If the flap is opened
 the rod t moves upward but owing to its
 115 provision with a long slot exerts no influence
 upon the locking tooth.

I claim:

1. In an excavator, the combination with
 a swinging support, a scoop mounted there-
 on, and a bottom hinged to the scoop, of a 120
 rotatable member mounted in the support,
 means operated by the movement of the bot-
 tom to rotate said member in opposite direc-
 tions, and means to exert a braking action
 on the rotatable member. 125

2. In an excavator, the combination with
 a swinging support, a scoop mounted there-
 on and a bottom hinged to the scoop, of a
 rotatable member mounted in the support,
 means connected with the bottom to rotate 130

said member in opposite directions, a brake disk connected with the latter and means to exert a braking action on the disk.

3. In an excavator, the combination with
5 a swinging support, a scoop mounted thereon and a bottom hinged to the scoop, of a rotatable member mounted in the support, rigid means connected with the bottom to rotate said member in opposite directions, a
10 brake disk connected with the latter and means to exert a braking action on the disk.

4. In an excavator, the combination with
a swinging support, a scoop mounted thereon, and a bottom hinged to the scoop, of a
15 rotatable member mounted in the support, rigid means connected with the bottom to rotate said member in opposite directions, a brake disk connected with the latter, a brake band surrounding the disk connected with
20 the scoop, and means to actuate the band.

5. In an excavator, the combination with
a swinging support, a scoop mounted thereon, and a bottom hinged to the scoop, of a shaft journaled in the support, means connected
25 with the bottom to rotate the shaft in opposite directions, a brake disk, means to fix the latter to the shaft, a brake band surrounding the disk and means to regulate the action of the band.

6. In an excavator, the combination with
a swinging support, a scoop mounted thereon and a bottom hinged to the scoop, of a shaft journaled in the support, rigid members connected with the bottom to rotate the
35 shaft in opposite directions, a brake disk rotatable on the shaft, means to automatically connect the disk and shaft, a brake band surrounding the disk and means to regulate the action of the band on the shaft.

7. In an excavator, the combination with
a swinging support, a scoop mounted thereon and a bottom hinged to the scoop, of a gear journaled on the support, a rack on the
40 bottom in mesh with the gear, a brake-member on the support, and a brake member connected with the scoop cooperating with the first mentioned brake member.

8. In an excavator, the combination with
a swinging support, a scoop mounted thereon and a bottom hinged to the scoop, of
50 gears journaled on the support, racks formed on the bottom in mesh with the gears, a brake disk, means to connect the latter with

the gears, and a brake band surrounding the disk connected with the scoop.

9. In an excavator, the combination with
a support, a scoop mounted thereon and a bottom hinged on the scoop, of a shaft
55 mounted on said support, a brake-disk on the shaft, gears mounted on the latter, segmental racks connected with the bottom in
60 mesh with the gears and a weight controlled brake-band surrounding the disk, and means to control the action of the weight on the band.

10. In an excavator, the combination with
a support, a scoop mounted thereon and a bottom hinged on the scoop, of a shaft
65 mounted on said support, a brake disk rotatable on the shaft, gears loosely mounted on the latter, segmental racks connected with the bottom in mesh with the gears, means to
70 connect the gears and brake disk and a weight controlled brake-band surrounding the disk, and means to control the action of
75 the weight on the band.

11. In an excavator, the combination with
a support, a scoop mounted thereon, and a bottom hinged on the scoop, of a shaft
80 mounted on said support, a brake disk rotatable on the shaft, gears loosely mounted on the latter, segmental racks connected with the bottom in mesh with the gears, ratchets connected with the gears, pawls on the brake
85 disk adapted to engage the ratchets, and a braking member cooperating with the brake disk.

12. In an excavator, the combination with
a support, a scoop mounted thereon, and a bottom hinged on the scoop, of a shaft
90 mounted on said support, a brake disk rotatable on the shaft, gears loosely mounted on the latter, segmental racks connected with the bottom in mesh with the gears, ratchets connected with the gears, pawls on the brake
95 disk adapted to engage the ratchets, a brake band surrounding the brake disk connected at one end to the scoop, a brake lever connected to the other end of said band, a weight on the brake lever, and means to
100 counteract the effect of the weight.

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Witnesses:

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