No. 883,810. PATENTED APR. 7, 1908.

B. KNITTEL.

HAIR FABRIC LOOM.

APPLICATION FILED JUNE 13, 1907.

Fig. 1

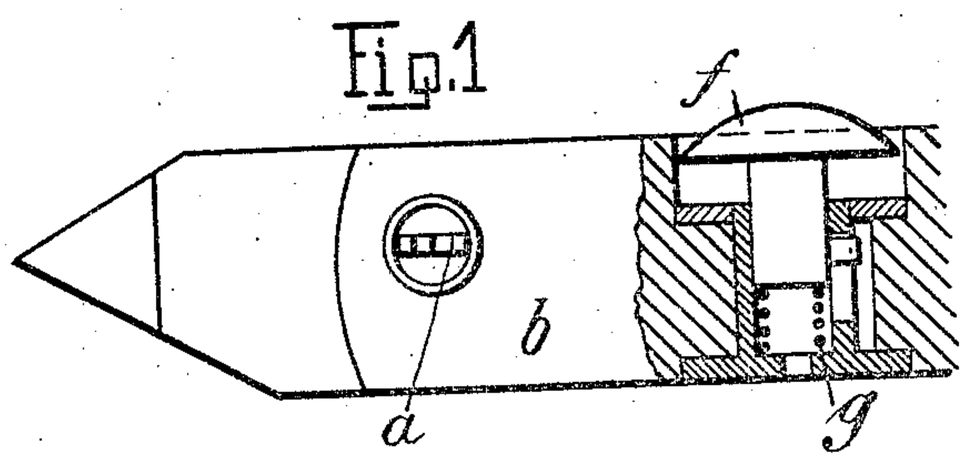



Fig. 2

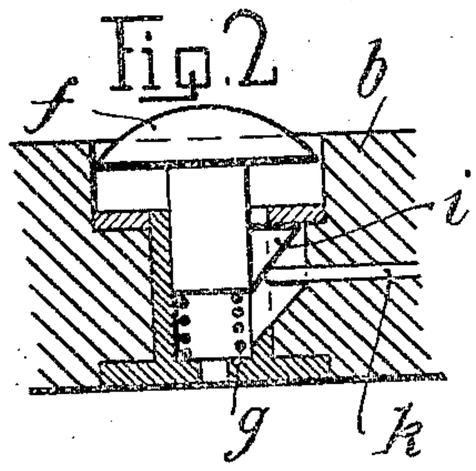



Fig. 3

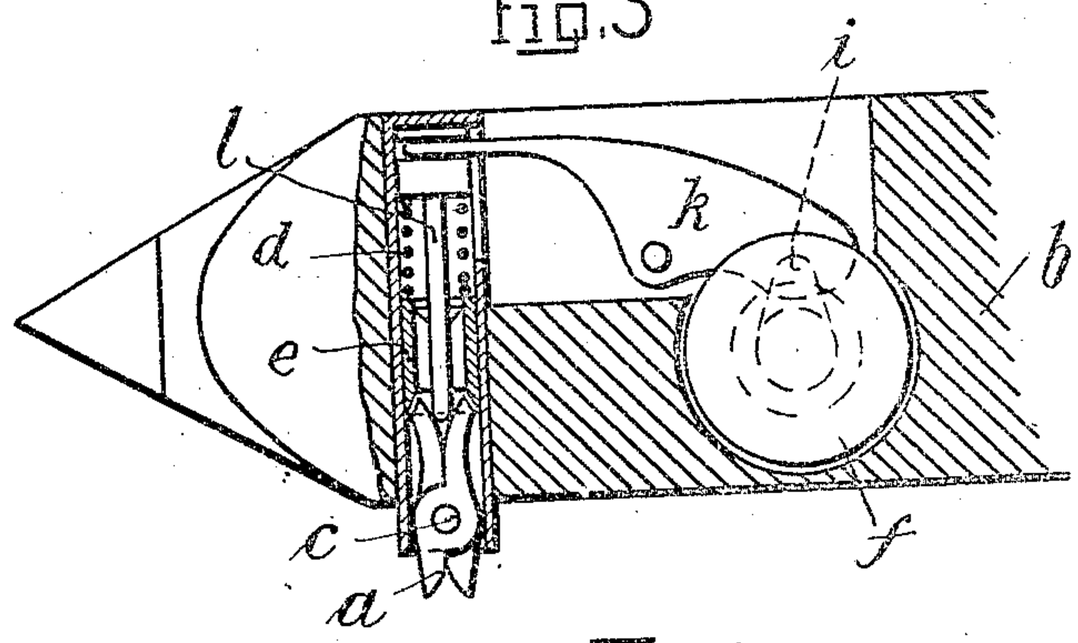
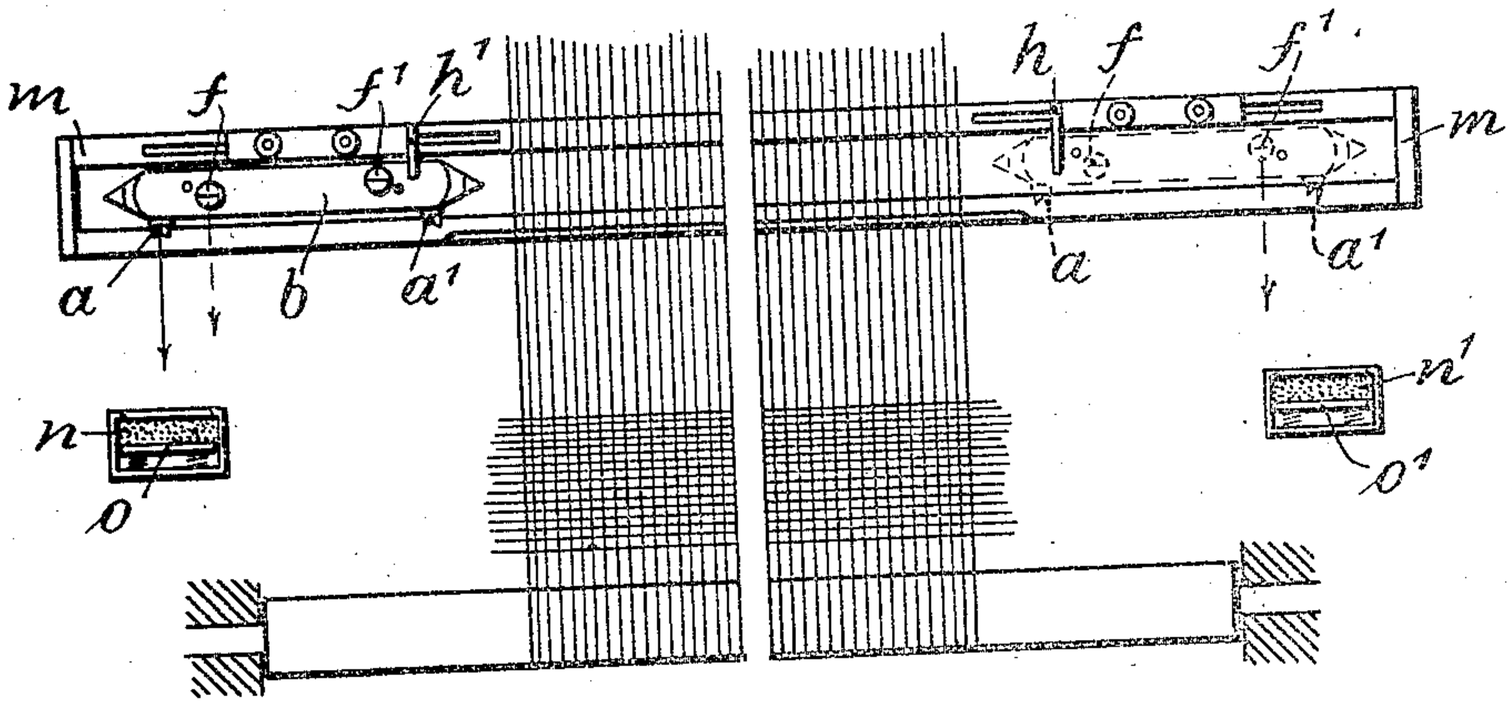



Fig. 4




Witnesses

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# UNITED STATES PATENT OFFICE.

BRUNO KNITTEL, OF DRESDEN, GERMANY.

## HAIR-FABRIC LOOM.

No. 883,810. Specification of Letters Patent. Patented April 7, 1908.

Application filed June 13, 1907. Serial No. 378,784.

*To all whom it may concern:*

Be it known that I, BRUNO KNITTEL, a subject of the German Emperor, and residing at Dresden, German Empire, have invented certain new and useful Improvements in Hair-Fabric Looms, of which the following is a specification.

My invention relates to improvements in looms for weaving so-called horse hair fabrics.

According to my invention two nippers for catching the hairs are located at the side of the shuttle and extend forwardly in the direction of motion of the lay. The latter in making its regular, steady strokes advances the nippers to bundles of hair located at both sides of the loom, in front of the lay. One of the nippers seizes a single hair, which is then shot into the shed on the passage of the shuttle. The jaws of the nippers are so formed as to present between them an inwardly narrowing gap, at the back of which is the actual nipper mouth which bites the hair. This mouth is so small that it can not nip more than a single hair. The nipper jaws are relatively long and pointed, so that they can readily enter the hair bundle without pressing the hairs together. The office of the narrowing gap is to conduct the hairs lying within its province toward the nipper mouth, so that one of them may be seized. Since the shuttle after each passage does not always come to rest at exactly the same spot, it is obvious that the nippers will take the hair from different parts of the bundle, which must naturally be of such width that the nippers may find hairs presented to them in whatever position they occupy. The nipper jaws may be opened for the purpose of seizing a hair either merely through the pressure exerted by their advance into the bundle, or by positive means. The reopening of the nippers for release of the seized hair may be effected by a spring actuated stud, which as the shuttle is thrown to and fro passes below an adjustable stop on the lay, which depresses it and causes it to actuate devices which compel the nippers to yield up the hair.

In the accompanying drawing—Figure 1 is an elevation and part section of a fragment of a shuttle constructed according to this invention. Fig. 2 is a cross section, and Fig. 3 a horizontal section through the same. Fig. 4 is a sectional plan showing the lay, fore beam and hair bundles, the central portion being removed to save space in the drawing.

The shuttle *b* is furnished at the side with two nippers *a a*$^1$ (Fig. 4) which project in the direction of motion of the lay *m*, the shuttle being brought up to the bundles of horse hair at *n n*$^1$ by the forward swing of the lay. Each of the nippers has two limbs pivoted at *c* (Fig. 3). The jaws *a* (the jaws *a*$^1$ are precisely the same) present between them a gap which gradually decreases in width in inward direction, while they only actually contact over quite a short distance, so that it is only possible for a single hair to be seized by them in this minute mouth. The jaws are closed by a spring *d*, which forces a conically chamfered sliding sleeve *e* over the chamfered ends of the nipper shanks. The jaws open against the action of the spring *d*, on the advancing lay driving the nippers into the bundle of hair, certain hairs being at the same time gathered together by the wedge shaped nipper gap. That hair which has penetrated furthest into the gap will on the pressure being relieved (that is, on the lay commencing its backward swing) be seized by the closing nipper mouth. The nipper jaws are reopened by the vertical rivet shaped stud *f* actuated by the spring *g*. When the head of the stud, on the shuttle being shot to and fro, passes below a stop *h* on the lay, a wedge shaped projection *i* on the shank of the stud presses against a lever *k* which swings in a horizontal plane and presses upon a pin *l*, against whose head the spring *d* abuts. The spring will be compressed but at the same time the pin *l* forced forward, so that the nipper mouth will slightly open and release the hair until now held by the jaws. The stud *f*$^1$ for the nippers *a*$^1$ is the twin of the stud *f*. The two studs, as is seen from Fig. 4, lie on opposite sides of the shuttle axis, and their heads are cut away up to the latter, so that of the two stops *h h*$^1$ furnished on the lay, the former, *h*, alone depresses the stud *f*, and the latter, *h*$^1$, alone depresses the stud *f*$^1$. The stops *h h*$^1$ can be adjusted at the back of the lay *m*, to suit the width of the fabric.

In the passage of the shuttle only the rear nippers work; thus on the shuttle being shot from left to right the nippers *a* acts, while on the shuttle passing from right to left the nippers *a*$^1$ is active. *n n*$^1$ are the holders containing the bundles of horse hair, which are pressed forward by spring controlled plates *o o*$^1$. The holders are of such breadth that in whatever position the shuttle may halt,

the nippers always lie within the province of the holder aperture. The holders instead of being secured in vertical position as shown in the drawing, may be placed in horizontal position, the horse hair being presented to the nippers correspondingly. Supposing the shuttle to be shot from right to left: the stud $f^1$ on passing below the stop $h^1$ will be depressed and will cause the nippers $a^1$ to open and release the hair which it has just carried through the shed. On the lay $m$ now swinging forward, the nippers $a$ will enter the hair in the holder $n$, a number of hairs will be fed by the nipper gap toward the small mouth, and the latter will open and seize the foremost hair. On the shuttle being now shot toward the right the nippers $a$ will carry the seized hair through the shed. Upon the stud $f$ passing below the stop $h$, however, the nippers $a$ will be reopened and the hair will be released. Hereupon the nippers $a^1$ will seize a hair from the holder $n^1$ and so on.

As already remarked, the nippers, for the purpose of seizing the hair, may be opened by positive means if desired. In such case suitable stops may be provided on the frame of the loom, which on the forward swing of the lay are passed under by the studs $f\,f^1$, moving in the direction of the broken-line arrow in Fig. 4. The studs being thus depressed effect opening of the nippers in the manner above described.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is—

1. In a hair fabric loom, a lay, a shuttle carried thereby, and nippers mounted transversely in the shuttle with their jaws projecting laterally beyond the sides of the shuttle, substantially as described.

2. In a hair fabric loom shuttle, nippers having their jaws projecting transversely beyond the sides of the shuttle, said jaws being outwardly curved on their inner sides, and means for preventing the closing together of the jaws beyond the extreme inner ends thereof, substantially as described.

3. In a hair fabric loom, a shuttle provided with shanked nippers, a spring actuated sleeve whose inner edge is chamfered and yieldingly tends to slide over the nipper shanks, and means, automatically operated as the shuttle approaches the end of its race, for opening the nippers, substantially as described.

4. In a hair fabric loom, a lay, a stop thereon, a shuttle carried by the lay and provided with shanked nippers, a spring actuated sleeve whose inner edge is chamfered and bears over the ends of the nipper shanks with a tendency to close the nippers, a spring actuated stud projecting from the shuttle and depressible on passing below said lay stop, and means operated by the depression of the stud for opening the nippers, substantially as described.

5. In a hair fabric loom, a lay, a shuttle carried thereby, shanked nippers carried by the shuttle, a spring actuated sleeve operating upon the shanks to close the nippers, a pin arranged between the nipper shanks, and means for positively actuating the pin to open the nippers as the shuttle approaches the end of its race, substantially as described.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

BRUNO KNITTEL.

Witnesses:
OTTO BLANKMIESTER,
PAUL ARRAS.