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VACUUM CLEANER NOZZLE HAVING PIVOTED CLEANING ELEMENT

Filed June 4, 1948

2 Sheets-Sheet 1

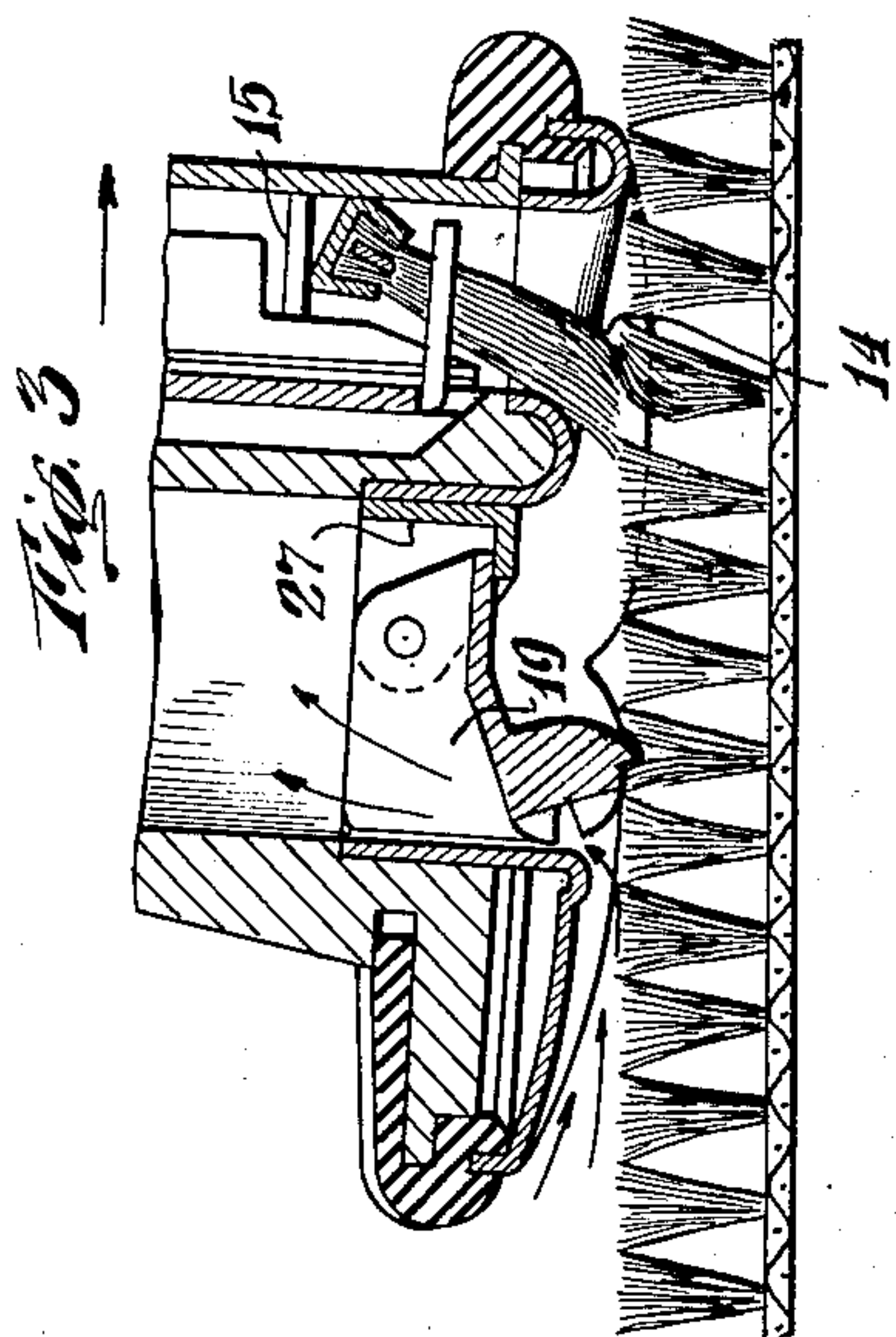


Fig. 3

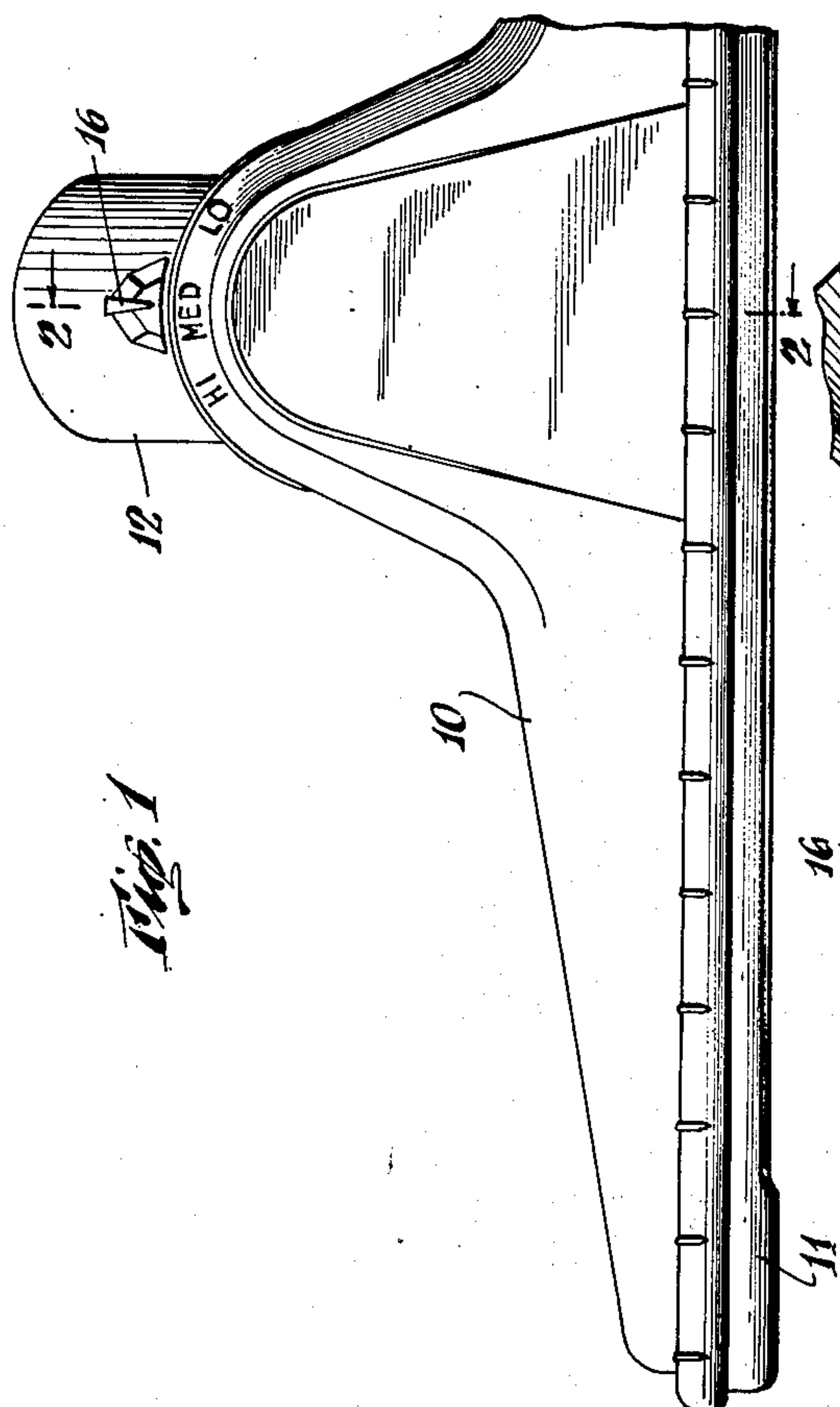
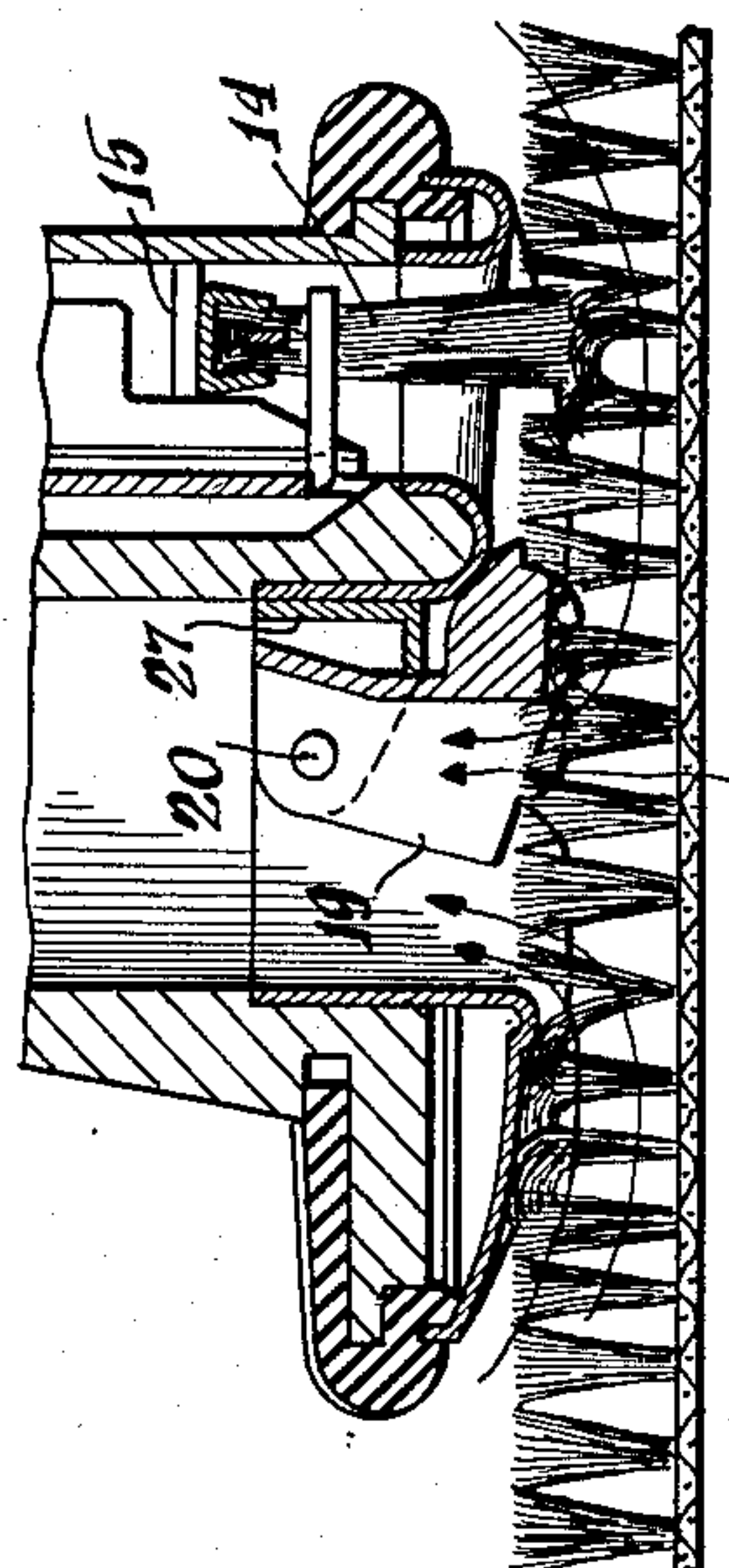


Fig. 1

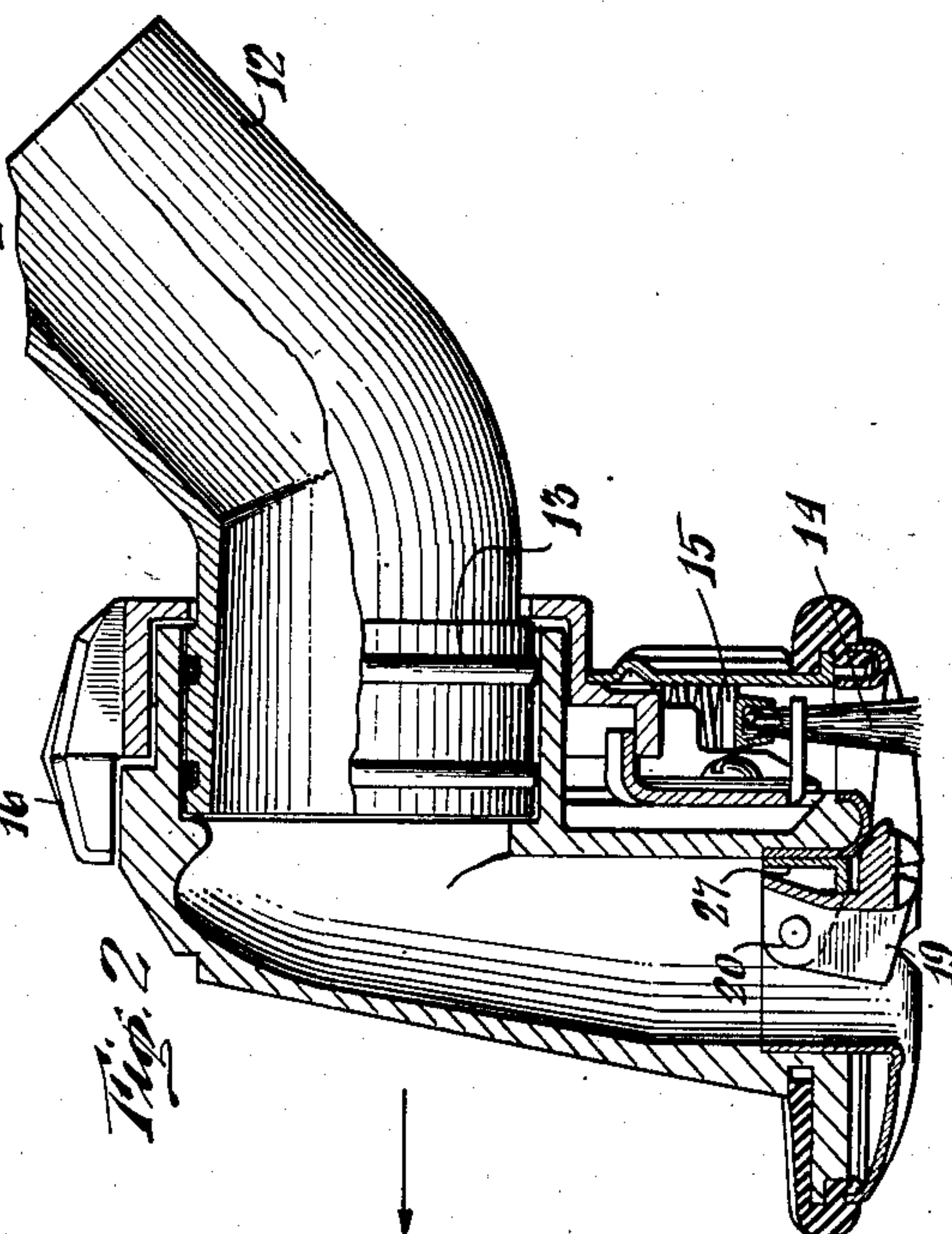


Fig. 2

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2 Sheets-Sheet 2

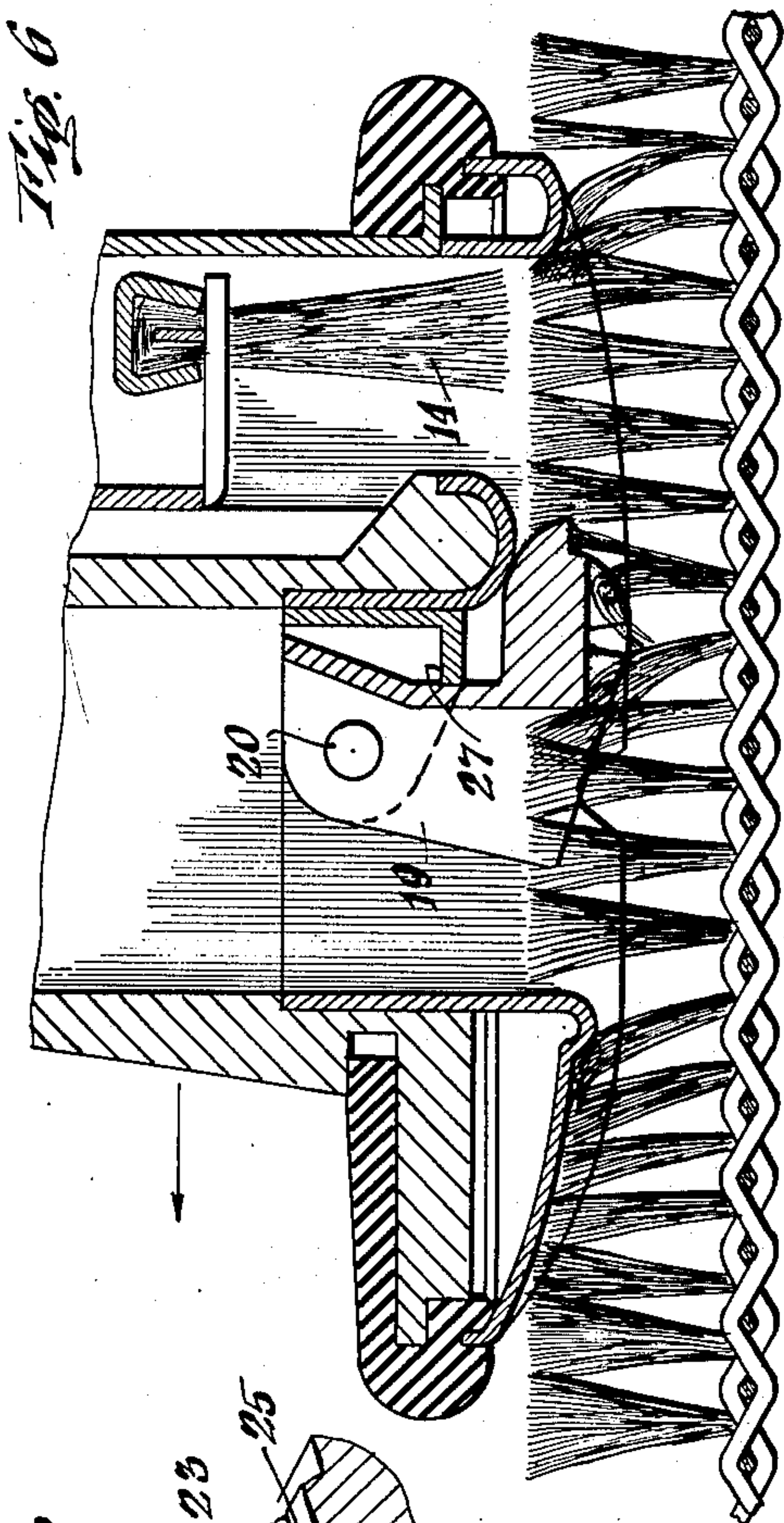


Fig. 8

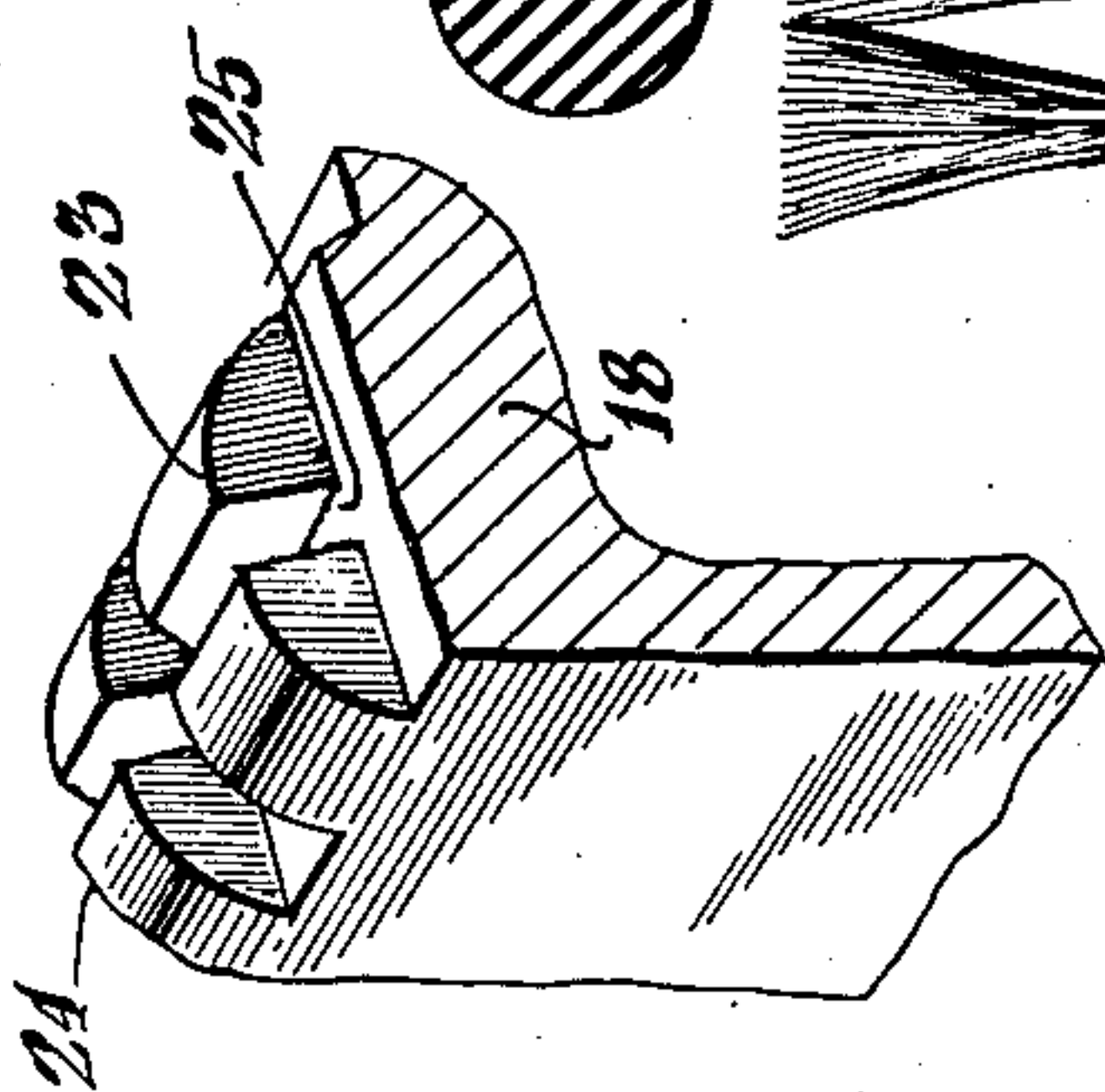


Fig. 7

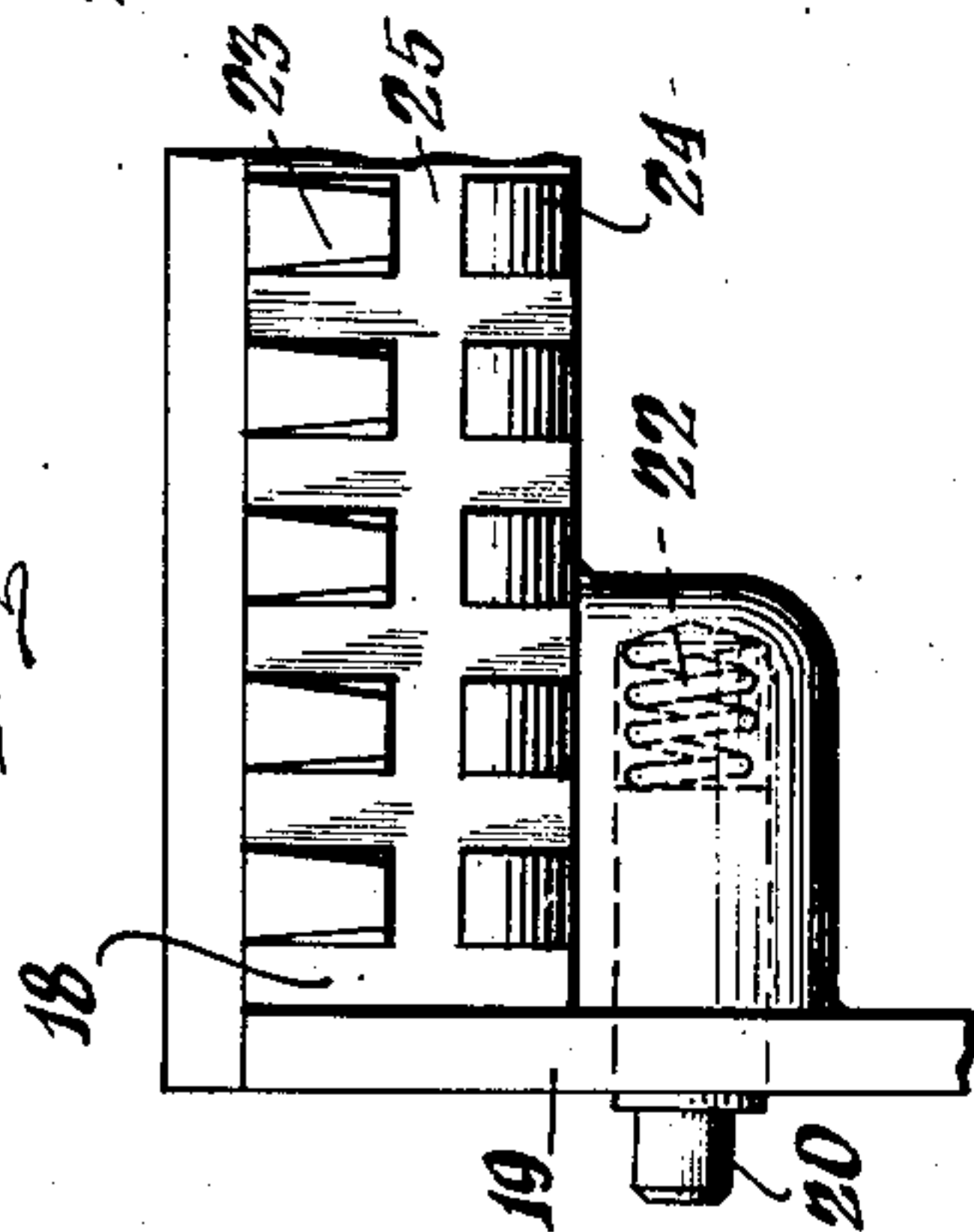
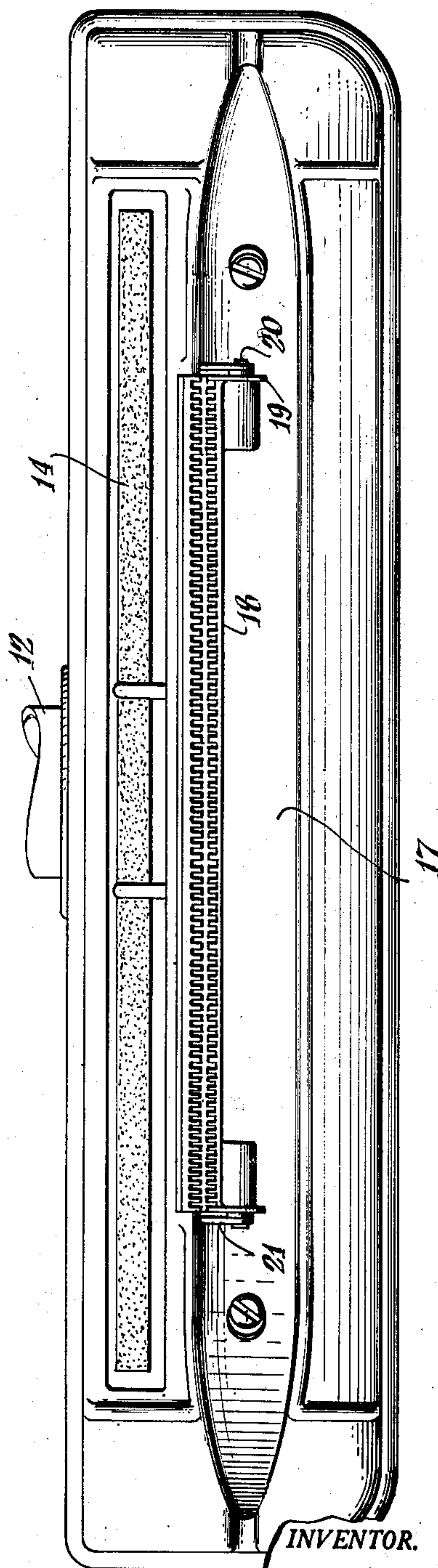


Fig. 5



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VACUUM CLEANER NOZZLE HAVING
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Application June 4, 1948, Serial No. 31,189

5 Claims. (Cl. 15—365)

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This invention relates to a structurally and functionally improved nozzle assembly especially intended for use in connection with vacuum cleaning apparatus.

It is a primary object of the invention to furnish a structure of this type and by means of which hairs, threads, and similar foreign material adhering to the fibers of a rug or to any other surface may be readily removed therefrom.

A further object is that of furnishing such an assembly, the operation of which will be substantially automatic so that no conscious effort will be involved on the part of the operator in removing the threads, etc. from the surface being cleaned; such removal being effected by the usual traversing movements of the nozzle over such surface.

A further object is that of providing a nozzle assembly embodying relatively few parts, each individually simple and rugged in construction and capable of being readily assembled to furnish a unitary apparatus functioning over long periods of time with freedom from all difficulties.

With these and other objects in mind reference is had to the attached sheets of drawings illustrating one practical embodiment of the invention and in which:

Fig. 1 is a fragmentary face view of a nozzle;

Fig. 2 is a transverse sectional view taken along the lines 2—2 and in the direction of the arrows as indicated in Fig. 1;

Fig. 3 is a fragmentary somewhat enlarged sectional view showing the nozzle in movement in one direction over a surface being cleaned;

Fig. 4 is a similar view showing the normal position of the parts;

Fig. 5 is a bottom plan view of the nozzle as illustrated in Fig. 1;

Fig. 6 is a view similar to Fig. 3 but showing the parts moving in an opposite direction;

Fig. 7 is an enlarged fragmentary plan view of an element of the nozzle; and

Fig. 8 is a fragmentary perspective view of such element.

With particular reference to Figs. 1, 2 and 5 it will be seen that the numeral 10 indicates a housing preferably constructed of metal and having floor contacting portions 11. This nozzle is attached to a vacuum cleaner or suction apparatus by means of a rearwardly extending tube 12 which may be swivelly coupled to the housing 10 and mount packing members 13 to reduce or eliminate leakage. The housing 10

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may also provide a rear compartment within which a brush 14 is disposed and which brush may be retracted or projected by means of mechanism generally indicated at 15. This mechanism is conveniently controlled by an actuator 16.

The foregoing structure has been generally illustrated in a prior application for United States Letters Patent filed in the name of Alex M. Lewyt and Carl E. Meyerhoefer on February 1, 1947, and identified under Serial number 725,890 the title of that application being "Suction Nozzle with Brush." In many respects the present invention is intended for use in combination with a unit of the type covered in that application. However, as will be understood, the teachings of this application may be employed to advantage in numerous associations and need not be necessarily be combined with a brush structure. Thus, except where otherwise defined by the claims the showing of this assembly of mechanism is to be taken in illustrative rather than in a limiting sense.

As shown especially in Fig. 5, a cleaning or hair and thread removing element is mounted within the mouth 17 of the nozzle. The body of this element has been indicated at 18. Adjacent its ends it may be provided with ears 19 from which pins 20 extend. The latter project through openings forming parts of arms or brackets 21 secured to the main housing assembly 10 within the throat portion. As indicated by the reference numeral 22 in Fig. 7, one or both of the pins 20 may be spring pressed. This will permit of the body 18 being detachably mounted in the position described.

The lower face of element 18—with the latter in normal position—preferably presents comb structures comprising rows of opposed teeth 23 and 24. The teeth 24 of the forward row should be at least as large as the teeth 23 of the rear row. As shown, they are conveniently slightly larger. These teeth are separated by a tapered groove or space 25. Due to the pivot structure provided by the pins 20 or their equivalent, the combs and face of element 18 may normally extend downwardly as in Figs. 2, 4, 5, and 6, or may else be rocked upwardly around these pivots to assume a position as shown in Fig. 3. This rocking action will occur automatically as the nozzle mounting the element is reciprocated over a surface to be cleaned. It will be understood that the frictional contact between the element and the supporting surface will assure of this result.

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When the element is in what might be termed its downward position, further movement of the same to the rear is prevented by a flanged stop member or plate 27. In that position the outer edges of the teeth 23 and 24 preferably lie in a plane co-extensive with the plane into which the contacting portions 11 of the nozzle project. When element 18 is in its uppermost position as in Fig. 3, the two series of comb teeth lie immediately adjacent the forward wall of the throat portion 17. Again movement of the element beyond this point may be arrested by the stop plate 27 contacting a suitable portion of the element. As will also be noted from this figure the lower edge of the element—when it is rocked forwardly—may conveniently extend to a point slightly below the contacting portions 11. In this position the rear edges of teeth 24 may extend substantially horizontally.

With the nozzle moving forwardly or to the left as viewed in Figs. 2 and 6, the toothed element will assume the position shown in those figures. It will also assume the same position with the brush 14 projected as in the case of the parts being adjusted as shown in Fig. 4. As the nozzle moves in this forward direction pressure is necessarily exerted at a substantially 45° angle through the fitting or tube 12. Consequently the ridges of the plate defining the throat 17, the teeth of the comb and the brush 14 (if projected) all intimately engage the nap of the carpet. Therefore in order for air to flow it must pass through the body of the carpet and the nap. Consequently imbedded dirt is removed on this forward stroke of the nozzle. At the same time teeth 24 will ride in contact with and depress the rows or tufts providing the nap of the carpet. In this manner the nap will be furrowed immediately in advance of being engaged by teeth 23 so that the latter will not entangle with the carpet nap should the latter be of looped formation. However, threads, hairs and similar substances will ride upwardly within the groove 25 intervening the rows of teeth and as the nozzle moves forwardly over the nap, these foreign materials will be caught against the forward edges of the teeth 23 and moved forwardly with the same. Upon the reverse stroke of the nozzle as shown in Fig. 3, frictional contact between the arcuate tooth edge face of the element 18 and the surface being cleaned will cause that element to rock upwardly. Therefore, the throat of the nozzle will be closed to a substantial extent. Accordingly the velocity of air flow through the passages which remain between the body of the element and the adjacent nozzle wall will be increased to a material extent; the rear part of the comb element body acting in cooperation with the flanged member 27 or other air obstructing surface. With the rearward stroke of the nozzle and as shown in the view under consideration, the latter will tend to rock to a limited extent around its rear edge. Therefore air will flow along the path indicated by the arrows in Fig. 3. Such air flow will cause an outward and upward movement of the hair, lint and threads hooked or caught on to the forward edges of the teeth 23. Therefore this foreign material will be drawn upwardly through the throat of the nozzle and so into the dust receptacle of the vacuum cleaner.

Immediately upon initiation of a second forward stroke, the element 18 will again assume the position shown in Figs. 4 and 6. This will occur because of the frictional engagement be-

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tween that element and the surface being cleaned and the movement of the nozzle over the same. Therefore the entire action will again be repeated. If the teachings of the present invention are embodied in a nozzle having a brush as shown and the latter is projected as in Figs. 3 and 4, an especial vigorous and deep cleaning action will occur as the nozzle is passed back and forward over the rug surface. In fact in many instances with the projection of the brush, hairs and threads which are somewhat deeply imbedded in the pile of the rug will be brought to a surface position where on the next stroke of the nozzle they will be caught by the teeth 23 of the comb. In this connection it will be noted as in Figs. 3 and 4 that the brush rocks in synchronism with the comb element. The arcuate movement of the brush is less than that of the comb. However, with the brush projected as shown in these figures, a forward movement of the nozzle over the surface to be cleaned results in the brush extending in a direction substantially perpendicular to the surface being cleaned in order to agitate the fibers of that surface to a maximum depth and thus dislodge therefrom any deeply embedded foreign material or material which is entangled in the nap of the rug. When the nozzle is moved in a rearward direction as in Fig. 3, then in synchronism with the rocking of the comb element, the brush also rocks to assume a position inclined towards the opening within which that element is disposed. Therefore, incident to frictional contact between the nap and the brush, particles and other materials adhering to the latter will be wiped out of engagement with that brush as the nozzle moves rearwardly. Thereupon, with the next forward stroke of the nozzle, this material will either be picked up by the suction and passed through the throat of the nozzle or else will be engaged by the teeth of the comb element and distributed as afore described. Where no brush is employed or where the latter is retracted as in Fig. 6, the element 18 will still provide a most desirable function in conjunction with the flow of air through the nozzle itself.

Quite aside from the advantage of an apparatus such as this in removing threads, hair and similar material from a surface being cleaned, a great advantage is derived in that particles having high specific gravity will also be removed from that surface or the body of the rug. In this connection it will be understood that as the nozzle is moved forwardly surface dirt and light particles will be drawn into the throat of the nozzle and then passed through to the dust receptacle. However, the degree of vacuum and velocity of air flow may not be sufficiently intense to remove particles having high specific gravity or which are deeply imbedded in the nap or body of the rug. Under these circumstances and during the rearward stroke of the nozzle, the throat of the latter is restricted to a material extent in the manner afore described. With such restriction the velocity of air flow is increased to a great extent. Therefore, any relatively heavy particles adjacent the nozzle in its passage over the surface being cleaned will be shifted by this high velocity air flow and transferred to the throat of the nozzle on the rearward stroke of the latter.

Thus, among others, the several objects of the invention as specifically aforementioned are achieved. Obviously numerous changes in construction and rearrangement of the parts may be resorted to

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without departing from the spirit of the invention as defined by the claims.

I claim:

1. A vacuum cleaner nozzle comprising a body formed in its lower face with a longitudinal opening extending transversely to the direction of nozzle movement, a throat portion communicating with said opening and connectable to a source of suction, said opening being defined by spaced forward and rear edges substantially parallel to the forward and rear faces of said body, brackets mounted by said body at points adjacent to opposite ends of said opening, a flanged member extending from the rear edge of said opening in a forward direction, a comb element, teeth formed in one of the edges of said element and the latter extending upwardly from said teeth, pivots connecting said element with said brackets, whereby said toothed edge may rock from a point immediately adjacent the forward edge of said opening to a point immediately adjacent the rear edge of the same and the upwardly extending portion of said element engaging with the upper surface and edge portion respectively of the forwardly extending flanged member to provide stops limiting the movements of said comb edge in both directions.

2. A vacuum cleaner nozzle comprising a body formed in its lower face with a longitudinal opening extending transversely to the direction of nozzle movement, a throat portion communicating with said opening and connectable to a source of suction, said opening being defined by spaced forward and rear edges substantially parallel to the forward and rear faces of said body, brackets mounted by said body at points adjacent to opposite ends of said opening, a flanged member extending from the rear edge of said opening in a forward direction, a comb element, teeth formed in one of the edges of said element and the latter extending upwardly from said teeth, pivots connecting said element with said brackets, whereby said toothed edge may rock from a point immediately adjacent the forward edge of said opening to a point immediately adjacent the rear edge of same, the upwardly extending body portion of said element engaging with the upper surface and edge portion respectively of the forwardly extending flanged member to provide stops limiting the movements of said comb edge in both directions and the toothed comb edge presenting an outer arcuate surface whereby said element will have a rolling contact with the surface being cleaned as said nozzle is reciprocated over said surface.

3. A vacuum cleaner nozzle comprising a body formed in its lower face with a longitudinal opening extending transversely to the direction of nozzle movement, a throat portion communicating with said opening and connectable to a source of suction, said opening being defined by spaced forward and rear edges substantially parallel to the forward and rear faces of said body, brackets mounted by said body at points adjacent to opposite ends of said opening, a flanged member extending from the rear edge of said opening in a forward direction, a comb element, teeth formed in one of the edges of said element, the latter extending upwardly from said teeth, pivots connecting said element with said brackets, whereby said toothed edge may rock from a point immediately adjacent the forward edge of said opening to a point immediately adjacent the rear edge of same, the upwardly extending portion of said element engaging with the upper surface

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and edge portion respectively of the forwardly extending flanged member to provide stops limiting the movement of said toothed edge in both directions and the upwardly extending portion of said element, when said comb is adjacent the forward edge of said opening, cooperating with said flanged member to provide a substantially air-imperious structure whereby air flow is diverted to the space between the teeth of said element and the forward edge of the opening with the element in the position specified.

4. A vacuum cleaner nozzle including in combination a body movable forwardly and rearwardly over a surface to be cleaned, spaced forward and rear walls forming a part of said body and defining between them a relatively long and narrow opening extending in its lengthwise direction transversely of the direction of movement of the nozzle, a comb element disposed within said opening and pivotally connected to the rear wall of said body, means restricting the swinging movements of said comb to an arc at one limit of which—and during the forward movement of said body—such comb extends downwardly adjacent the lower surface of said body without substantially obstructing said opening and at the outer limit of movement—and during rearward movement of said body—swings to a point adjacent the surface of the forward wall to substantially diminish the flow of air through said opening and to increase the velocity of air movement between said comb element and forward wall, said body being formed with a further opening to the rear of and parallel to said first-named opening, a brush disposed within said further opening to extend downwardly adjacent the lower face of said body, means for pivotally supporting said brush in such position to swing in synchronism with the movements of said comb as said body is moved over the surface to be cleaned, said brush supporting means maintaining said brush in a position substantially perpendicular to such surface during the forward movement of said body and said brush assuming a position inclined towards said first-named opening during the rearward movement of said body over such surface.

5. A vacuum cleaner nozzle including in combination a body movable forwardly and rearwardly over a surface to be cleaned, spaced forward and rear walls forming a part of said body and defining between them a relatively long and narrow opening extending in its lengthwise direction transversely of the direction of movement of the nozzle, a comb element disposed within said opening and pivotally connected to the rear wall of said body, means restricting the swinging movements of said comb to an arc at one limit of which—and during the forward movement of said body—such comb extends downwardly adjacent the lower surface of said body without substantially obstructing said opening and at the outer limit of movement—and during rearward movement of said body—swings to a point adjacent the surface of the forward wall to substantially diminish the flow of air through said opening and to increase the velocity of air movement between said comb element and forward wall, said body being formed with a further opening to the rear of and parallel to said first-named opening, a brush disposed within said further opening to extend downwardly adjacent the lower face of said body, means for pivotally supporting said brush in such position to swing in synchronism with the movements of said comb

as said body is moved over the surface to be cleaned, said brush supporting means maintaining said brush in a position substantially perpendicular to such surface during the forward movement of said body, said brush assuming a position inclined towards said first-named opening during the rearward movement of said body over such surface and means whereby said brush-supporting means may be shifted to cause said brush to be retracted within its opening and to be projected beyond the lower face of said body.

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