Feb. 17, 1959 H. C. HEIER 2,873,700

SHIELDED EAVES TROUGHS

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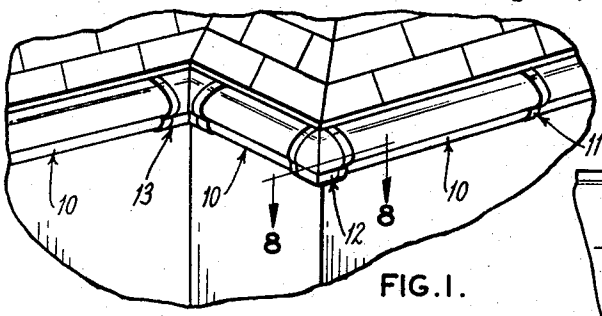
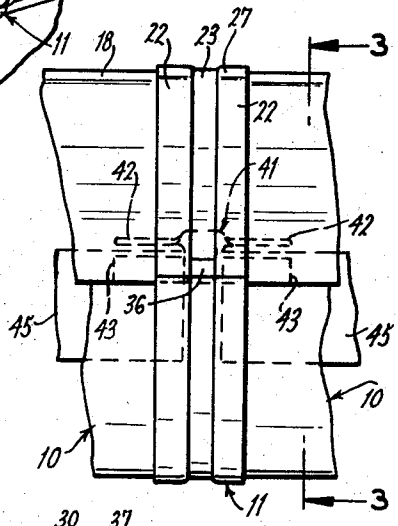


FIG. 1.

FIG. 2.



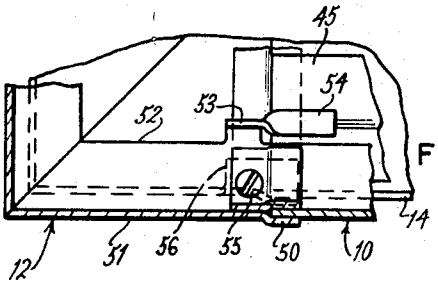


FIG. 8.

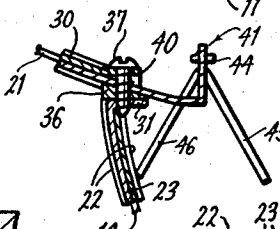


FIG. 5.

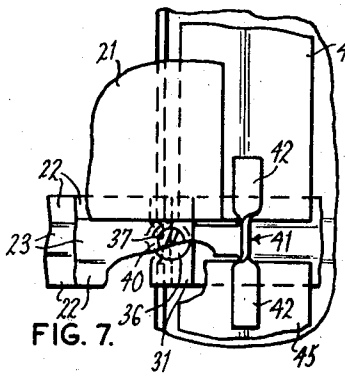
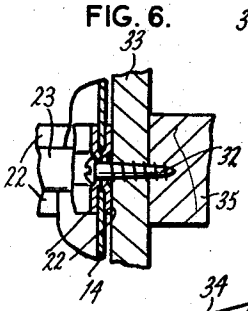


FIG. 7.

FIG. 6.



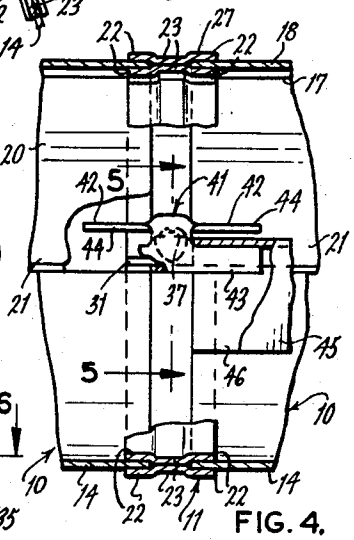


FIG. 4.

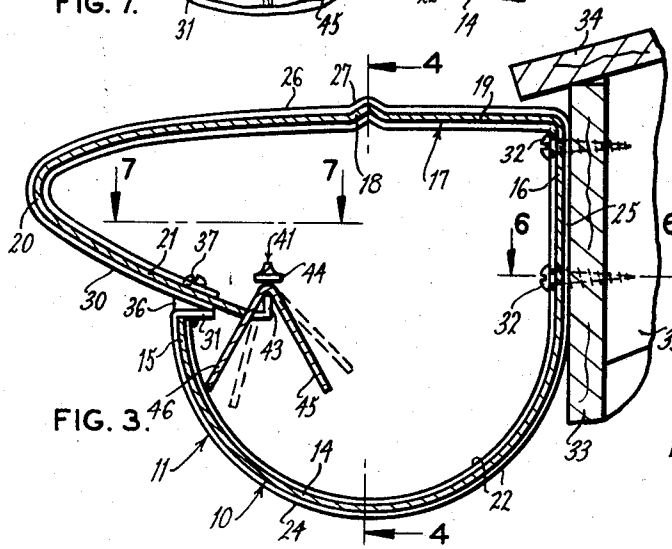


FIG. 3.

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SHIELDED EAVES TROUGHS

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This invention relates to improvements in shielded eaves troughs, and more particularly to improvements in an eaves trough structure that prevents foreign material, such as leaves, twigs and like material which may be washed from the roof, from entering and clogging the trough, and yet permits water to enter freely into the trough.

It is a principal object of this invention to realize an eaves trough structure which will effectively separate any solids from the entraining water that is washed from a roof as during a rainstorm. The novel construction of the eaves trough assembly prevents the introduction of such solids as leaves, twigs, rocks and like material into the trough, and serves to guide and direct the water into the trough incident to drainage to a sewerage system.

Another highly important objective is realized in providing an eaves trough which is so formed that any material other than water will pass over the trough and be expelled onto the ground therebelow, and that the water will be diverted into the interior of the trough.

Still another important object is realized in a bracket structure that interconnects and secures adjacent lengths of trough sections, the bracket being adapted to fix the relative positions of such adjacent trough sections upon assembly. Further objectives and advantages are realized by the bracket in securely fastening the eaves troughs to an eaves plate subtending the roof sheathing, and in locating adjacent coacting portions of the troughs to provide a longitudinal water inlet port.

Yet another important object is realized by the provision of a water gate structure carried internally of the trough structure, and adapted to block effectively the water inlet port under inoperative circumstances and conditions, and yet adapted to permit the entrance of water into the trough during a rainstorm. The gate structure is specifically adapted to prevent any dust or foreign objects from being brought into the trough by wind, and to eliminate or at least to a major extent reduce the turbulence of the flow of water through the inlet port, and hence in the trough incident to drainage.

A still further object of the invention is to provide an eaves trough structure having the foregoing advantages and others as will hereinafter be apparent, which is simple in construction and assembly, durable in operation and inexpensive in manufacture.

The foregoing and numerous other objects of the invention will more clearly appear from the following detailed description of a preferred embodiment, particularly when considered in connection with the accompanying drawing, in which:

Fig. 1 is a fragmentary perspective view showing the eaves trough assembled below a roof structure;

Fig. 2 is a fragmentary side elevational view of a pair of eaves trough sections connected in alignment by a bracket strip;

Fig. 3 is a view in cross section as taken along line 3—3 of Fig. 2;

Fig. 4 is a cross sectional view as taken along line 4—4 of Fig. 3;

Fig. 5 is a fragmentary view in cross section as taken along line 5—5 of Fig. 4;

Fig. 6 is a fragmentary view in cross section as taken along line 6—6 of Fig. 3;

Fig. 7 is a fragmentary top plan view as seen along line 7—7 of Fig. 3, and

Fig. 8 is a fragmentary view of an eaves trough and an outside corner bracket in cross section as taken along line 8—8 of Fig. 1.

Referring now by characters of reference to the drawing, and first to Fig. 1, a plurality of lengths of eaves trough, generally indicated at **10**, are shown mounted in sections adjacent a roof structure. A bracket strip referred to at **11** is utilized to secure adjacent eaves troughs **10** in alignment, while mitered bracket **12** is used to secure and position the eaves troughs about an outside corner. Similarly, bracket **13** is used to fix and arrange the eaves troughs about an inside corner.

Each eaves trough is preferably formed of a sheet metal, and is shaped to provide the configuration best shown in transverse cross section in Fig. 3.

From Fig. 3, it is apparent that the eaves trough **10** consists of a lower curvilinear trough portion **14** serving as a gutter that is or may be substantially arcuate in transverse section. The outermost wall **15** of trough portion **14** extends downwardly in an arcuate path to afford an upwardly concave trough structure. The innermost wall of trough portion **14** extends vertically upward to provide a planar mounting portion **16**.

Shown as formed integrally with the upper end of vertical wall portion **16**, is a cover portion **17** of substantially greater width than trough portion **14** so as to overhang the trough along the outside edge thereof. Spaced from vertical wall **16** is a substantially uppermost longitudinal formation **18** constituting a water retarding and distributing ridge, the purpose and function of which will be later more fully described. The inner region **19** of the cover portion **17** located to the right of ridge **18** (Fig. 3), has only a slight pitch, the region **19** constituting a fall plate that receives the flow of water directly from the roof structure. Of course, the fall plate **19** having a slight pitch is particularly adapted for use where the roof has a steep pitch, the fall plate **19** serving to slow and spread the flow of water from such roof. It is also intended within the scope of this invention, that the pitch of fall plate **19** can be increased, and used with a roof having a slight pitch, in which case the slow flow of water from the roof is accelerated by the steeper pitch of the cover portion **17**.

The outer part of cover **17** to the left of ridge **18** (Fig. 3) is shaped and formed to realize a U-shaped or a substantially semi-elliptical reentrant portion. This outer part of cover **17** extends outwardly and downwardly from ridge **18** along an elliptical curve, and gradually increases in downward slope to an outermost sharply curved breaking ledge **20**. The ledge **20** is formed and sharply rounded on a small radius. The cover **17** is then reversed from ledge **20**, and is extended downwardly and inwardly to form a water-directing leg **21** that passes above in spaced relation to and overlaps the outermost edge of trough wall **15**, the leg **21** terminating well within trough portion **14**. The space provided between the reversed or reentrant leg **21** and trough wall **15** affords a longitudinal slot constituting an inlet port to the interior of trough portion **14**.

In order to secure the eaves troughs **10** to a roof structure, any of brackets **11**, **12** and **13** may be conveniently

utilized depending upon the particular assembly. Each of the above noted brackets is constructed to secure together and position the adjacent lengths of eaves troughs **10**. Since the principles employed by each bracket are the same, and only minor structural modifications are necessary to adapt the brackets for the specific problems illustrated in Fig. 1, it is believed that a complete description of bracket **11** and correlating reference to the other brackets **12** and **13** will provide a complete disclosure.

Bracket **11**, for example is used to fasten and connect adjacent eaves troughs **10** in a straight alignment. The bracket **11** consists of a doubled strip structure, each strip having lateral flanges **22** and an intermediate internally depressed rib **23** as is more clearly shown in Figs. 2, 4 and 6. The overlying flanges **22** of the paired strips are adapted to receive therebetween the ends of adjacent trough lengths **10**, and rib **22** serves as an abutment for the trough ends received in the bracket to constitute a slip joint.

The bracket strip **11** is so formed and shaped as to provide a lower arcuate portion **24** as shown in transverse section by Fig. 3, a vertical wall portion **24**, and a cover portion **26** having a ridge **27** formed in each lateral flange **22**, all of which closely conforms to the corresponding gutter and cover portions of the trough structure. It will be noted that the outer part of cover portion **26** of bracket **11** follows the same U-shaped or semi-elliptical curved structure of the cover portion **17** of trough **10**, and provides a reversed leg **30**.

As best viewed in Figs. 3 and 5, the arcuate portion **24** is provided with an inturned horizontal flange **31** that normally abuts and overlies the outer wall **15** of trough portion **14**. The reversed leg **30** of bracket **11** extends downwardly and inwardly to engage the inner margin of flange **31**. It is preferred that the internal rib **23** is depressed so that its inner surface is flush with the adjacent inner surface of the eaves troughs **10** when telescopically assembled in bracket strip **11**. Of course, this flush interfitting bracket and trough structure, as best viewed in Figs. 4 and 6, will realize an unobstructed and free flow of water from one trough, through the bracket and thence to the other adjacent trough.

A wedge piece **36** constituting a spacer is located between horizontal flange **31** and adjacent reversed leg **31** of bracket **11**. A screw element **37** is received through a raised boss **40** formed on internal rib **23**, and is threadedly engaged with wedge piece **36** and horizontal flange **31**.

The bracket strips **11** are attached to the roof structure at regularly spaced intervals, each bracket being fastened by screws **32** that extend through intermediate rib **23** for threaded engagement with a vertical eaves plate **33** located below sheathing **34** and with joist **35**.

In assembling the eaves troughs **10** to opposite sides of bracket strip **11**, the ends of the eaves troughs are slipped into position between the paired, spaced lateral flanges **22** until the ends abut rib **23**. The otherwise open ends of the terminal trough sections are provided with suitable closure caps (not shown). It will be particularly noted that the reversed water-directing leg **21** is retained in spaced relation to the outermost wall **15** of trough portion **14** by the wedge connection of bracket **11**. Since the space provided between leg **21** and wall **15** constitutes a water inlet port, it is seen that the dimensions of such port may be varied by the size of wedge piece **36** utilized. It is obvious that a larger wedge piece **36** will hold flange **31** and reversed leg **30** of bracket **11** further apart, and hence will serve to spread reversed cover leg **21** and trough wall **15** to form a larger longitudinal inlet slot to accommodate a greater flow of water.

During a rainstorm, the water that flows off of the roof structure will entrain foreign material such as leaves, twigs, carbon particles and like material, and will flow onto the fall plate **19** of cover portion **17**. Since the region constituting the fall plate **19** has a slight pitch, which assumes a steep pitched roof, the flow of water will be spread or distributed more or less as an even film or sheet, and its velocity considerably reduced to assure an even flow into the trough. As the water flows outwardly over fall plate **19**, it encounters raised ridge **18** that further retards the flow velocity and causes an even distribution of water. After leaving ridge **18**, the water flows down the gradually increasing slope of cover **17** until it reaches the outermost rounded breaking ledge **20**. In that region, the foreign material carried by the flow of water is expelled from cover portion **17** and dropped to the ground. The water, on the other hand, is diverted around breaking ledge **20** and directed into the water inlet port by reversed leg **21** and thence into the interior of concave trough portion **14**. The water is then carried by gravity through the eaves trough structure to a vertical downspout drain (not shown) connected to a sewerage system.

The end of reversed cover leg **30** of bracket **11** is continued inwardly, and is formed to provide a vertical flange referred to at **41**. The flange **41** is constructed to provide opposed flange arms **42** that project laterally outward of bracket **11** and partially into the end of each adjacent trough **10** as is shown in Figs. 2, 4 and 7. Each flange arm **42** is bifurcated to form a lower horizontally extending arm portion **43** that constitutes a pivot as will later appear, and an upper arm portion **44** as best viewed in Figs. 3 and 4.

An inverted V-shaped gate or closure **45** comprised of an angulate strip is mounted on the horizontal pivots afforded by flanges **41** of a pair of spaced brackets **11**. The V-shaped gate **45** is inverted, and the ends inserted into the bifurcation formed in flange arms **42**, the gate **45** being arranged between horizontal arm portions **43** and **44** so that the apex of the gate is pivotally supported on arm portions **43**. In the preferred structure, the gate **45** is formed symmetrically, and is so dimensioned that one wall **46** of gate **45** normally contacts and engages the inner surface of trough portion **14** below the water inlet port, and abuts the end margin of reversed cover leg **21**. The horizontal arm portion **44** overlies gate **45**, and serves to retain the gate on its pivotal mounting and supporting arm portion **43**. It will appear that gate **45** is balanced on arm portion **43** in the position indicated by the full lines of Fig. 3, and yet is pivotally mounted so as to be swung to the position shown in dashed lines in response to a flow of water through the longitudinal inlet port. The gate **45** is limited in its range of swingable movement by arm portion **43** which abuts the gate when it is swung to the dashed line position, the arm portion **43** constituting a stop means.

As the flow of water is directed to and through the inlet port by reversed cover leg **21**, the water will strike wall **46** of gate **45** and consequently will swing gate **45** to the open position. The gate **45** serves to reduce the velocity of water flow after passage through the inlet port, and operates to minimize turbulence by directing and guiding the flow to the side wall of trough portion **14**, and hence to the side of the stream of water flowing longitudingally along trough portion **14**. Another important advantage is realized in the elimination of any undesirable dust or foreign objects that might be brought into the trough by wind through the inlet port, since wall **46** of gate **45** effectively closes the port in its normal pendular disposition by its contiguous relation to the inner margin of reversed cover leg **21** and the wall **15** of trough portion **14**.

Fig. 8 discloses a minor modification in a bracket structure, the bracket **12** being utilized for mitered outside corners as is shown in Fig. 1. The outside corner bracket **12** is constructed somewhat similarly to bracket **11** previously described, the bracket **12** including lateral flanges **50** adapted to overlie the ends of

troughs **10**. An internal intermediate portion **51** corresponds to internal rib **23** of bracket **11**, and provides an abutment that positions and fixes the troughs **10** when inserted into flanges **50**. The innermost end of a reversed cover leg **52** is also provided with a vertical flange **53** having one arm **54** extended laterally outward to support the swingable water gate **45** in pivotal relation. Another arm (not shown) is provided at the opposite side, in the same manner as arm **54**, to support a gate **45** located internally of an adjacent trough. In addition, a screw **55** is threaded through reversed cover leg **52**, and through a similar wedge piece or spacer **56** to engagement with an inturned flange that corresponds to flange **31** of bracket **11**. The bracket **13** is also similarly constructed, but specifically adapted for connecting adjacent troughs **10** to an inside corner.

In order to facilitate disassembly of the eaves trough structure, the troughs **10** may be constructed of separable parts, whereby the cover portion **17** may be removed without disturbing the mounting of the underlying trough portion **14**.

It is thought that the function of the above described eaves trough structure has become apparent, but for completeness of disclosure it will be noted that the water coming off of the assumed steep pitched roof is delivered to fall plate **19** which, as briefly described, retards and distributes the flow over cover **17**. When the flow reaches ridge **18**, the velocity is further reduced, and the stream further spread to afford an even flow into trough portion **14**. After leaving ridge **18**, the flow increases slightly in velocity until it encounters the sharply curved overhanging breaking ledge **20**. At this point, any foreign material carried in the stream of water is dropped off of ledge **20**, and the flow of water is diverted along the reversed cover leg **21**, and thence directed into the water inlet port. The flow of water is then retarded by the engagement with swingable water gate **45**, and is directed to the lateral wall of trough portion **14** for steady delivery to the stream carried therein to the sewer drain.

It is extremely important that the breaking ledge **20** is located outwardly remote from a vertical plane through the upper margin of outermost wall **15** of trough **14**. Some foreign objects, such as leaves, which are at times entrained in the flow of water from the roof, can be influenced to a certain extent by the wind. For example, a wind may catch a leaf just before it separates from ledge **20** and blows the leaf into the water inlet port if such ledge **20** were located in alignment with or inwardly of the vertical plane through the upper margin of outermost wall **15** of the trough. This cannot happen with the particular structure disclosed herein, since the breaking ledge **20** is located in outwardly remote location to the water inlet port. Wind cannot blow any foreign object such as leaves, before such objects can fall free and clear of ledge **20**.

Although the invention has been described by making detailed reference to a preferred embodiment, and minor modifications in bracket structures, such detail is to be understood in an instructive, rather than in any restrictive sense, many variants being possible within the fair scope of the claims hereunto appended.

I claim as my invention:

1. An eaves trough structure in the nature of a covered gutter, the covering element of which is attached to the gutter and so formed as to slope downwardly and outwardly laterally of the gutter, the outer portion of the cover consisting of a curved reentrant element extending to an end margin located in the trough and being arranged in spaced relation to the trough to provide a water inlet port to the trough, and a closure swingably mounted within the structure and adjacent said inlet port, the closure having a wall normally abutting a wall surface of the trough between the water inlet port and abutting the said end margin of the reentrant element.

2. In an eaves trough structure, a lower portion comprising the gutter, an upper portion serving as a cover for the gutter and of a width to extend in laterally overhanging relation thereto, a reversed portion of the cover being directed from said overhanging portion downwardly and rearwardly to an end margin located in the gutter and arranged in space relation with the gutter to provide a longitudinal water inlet port, and a closure located inwardly of said port having a wall normally engaging a wall surface of the gutter below the water inlet port and engaging the said end margin of the reversed cover portion in port-closing position, and means yieldably mounting said closure within the structure so that said closure moves away from said wall surface of the gutter and the end margin of the reversed cover portion when engaged by a stream of water into the gutter through said port.

3. In a top shielded eaves trough structure provided with a water inlet opening along one of its sides, a closure for said opening consisting of an inverted V-shaped element substantially coextensive in length with the trough, spaced brackets for supporting the trough, and supports carried by said brackets, providing pivot elements about which said V-shaped element is rockingly supported.

4. In an eaves trough structure, a plurality of lengths of covered guttering, each such length including a gutter, a cover thereabove of substantially greater width than the gutter and overhanging same along the outside of the gutter, the overhanging portion of the cover including a reentrantly folded portion providing an outer fall-breaking ledge, whence the fold portion is extended downwardly thence inwardly to provide an end margin inwardly of the gutter, and providing with a wall of the gutter, a longitudinal water receiving slot; a swingably supported slot closure element, brackets supporting the ends of said lengths of trough and cover, pivot elements carried by and extended horizontally from the brackets into the adjacent lengths of the troughs, the closure being swingably supported by the pivot elements, the closure having a wall that normally contacts the inner surface of the trough below the water-receiving slot and abuts the end margin of the reentrantly folded portion of the cover.

References Cited in the file of this patent

UNITED STATES PATENTS

836,012	Cassen	Nov. 13, 1906
891,405	Cassen	June 23, 1908
891,406	Cassen	June 23, 1908
1,238,993	Edwards	Sept. 4, 1917
1,682,840	Foerch	Sept. 4, 1928
2,669,950	Bartholomew	Feb. 23, 1954
2,672,832	Goetz	Mar. 23, 1954